KEYWORDS


ABSTRACT

This thesis addresses one of the fundamental issues that remains unresolved in patent law today. It is a question that strikes at the heart of what a patent is and what it is supposed to protect. That question is whether an invention must produce a physical effect or cause a physical transformation of matter to be patentable, or whether it is sufficient that an invention involves a specific practical application of an idea or principle to achieve a useful result. In short, the question is whether patent law contains a physicality requirement.

Resolving this issue will determine whether only traditional mechanical, industrial and manufacturing processes are patent eligible, or whether patent eligibility extends to include purely intangible, or non-physical, products and processes. To this end, this thesis seeks to identify where the dividing line lies between patentable subject matter and the recognised categories of excluded matter, namely, fundamental principles of nature, physical phenomena, and abstract ideas. It involves determining which technological advances are worth the inconvenience monopoly protection causes the public at large, and which should remain free for all to use without restriction.

This is an issue that has important ramifications for innovation in the ‘knowledge economy’ of the Information Age. Determining whether patent law contains a physicality requirement is integral to deciding whether much of the valuable innovation we are likely to witness, in what are likely to be the emerging areas of technology in the near future, will receive the same encouragement as industrial and manufacturing advances of previous times.
TABLE OF CONTENTS

KEYWORDS .................................................................................................................................................... i

ABSTRACT .................................................................................................................................................... i

TABLE OF CONTENTS ................................................................................................................................... i

LIST OF ABBREVIATIONS ............................................................................................................................ vi

STATEMENT OF ORIGINAL AUTHORSHIP .............................................................................................. vii

ACKNOWLEDGEMENTS ............................................................................................................................... vii

CHAPTER 1 - INTRODUCTION .................................................................................................................. 1

I  The Question This Thesis Addresses ........................................................................................................ 1

II  The Research in Context ............................................................................................................................. 3
   A  Traditional Conceptions of the Role of Patentable Subject Matter ..................................................... 3
   B  The Concept of ‘Invention’ in the Information Age .............................................................................. 7

III  The Importance of the Question This Thesis Addresses ......................................................................... 7
   A  Rampant Technological Innovation and Expanding Patentable Subject Matter ............................ 7
   B  Patents in the Service Economy and Knowledge-Producing Industries ........................................ 9
   C  The Issue is Not One That Patent Applicants Can Easily Circumvent ........................................... 11

IV  Why Some Courts and Commentators Favour a Physicality Requirement ........................................... 11
   A  A Patent System in Crisis? .................................................................................................................... 11
   B  The Patent Examination Process and the Quality of Issued Patents ............................................ 13
   C  Barriers to Entry ................................................................................................................................... 15

V  Methodology, Scope and Chapter Overview ........................................................................................... 16

CHAPTER 2 - HISTORY, PURPOSE AND THEORIES OF PATENT LAW .................................................. 21

I  Introduction ................................................................................................................................................ 21

II  History of Patent Law ................................................................................................................................. 21
   A  Early Patent Custom in the Republic of Venice ................................................................................ 23
   B  The Early English Patent Custom ....................................................................................................... 27
   C  Patents Under Elizabeth I ...................................................................................................................... 29
   D  The Statute of Monopolies .................................................................................................................... 36
   E  Disclosure of the Invention: Consideration for a Patent ................................................................. 39
   F  Uncertainty Regarding Processes During the Industrial Revolution ............................................. 40
   G  The Emergence of Patent Law in the United States ........................................................................ 42
   H  Emergence of the Inventive Step (Or Non-Obviousness) Requirement ........................................ 45
   I  Evolution of the Meaning of ‘Inventor’ ................................................................................................. 47
J. The Internationalisation of Intellectual Property Law ........................................ 48
K. 1977: The Statute of Monopolies Abandoned in the United Kingdom .......... 50
L. From the History of Patent Law to the Theories That Underpin Its Existence 51

III Theories of Patent Law .................................................................................. 51
   A The Four Theories Traditionally Used to Justify the Patent System .......... 52
   B The Incentive Theory of Patent Law ............................................................... 54
   C New Ideas Justifying the Patent System ....................................................... 63
   D Patents as a Species of Property .................................................................. 69

IV Incentive Theory and Information Economics in the Information Age ....... 71
   A Innovation Theory in the Information Age ................................................ 72

V Conclusion ........................................................................................................ 81

CHAPTER 3 - PATENTABLE SUBJECT MATTER IN THE UNITED STATES .......... 86

I Introduction .......................................................................................................... 86

II Constitutional and Legislative Framework ..................................................... 87
   A The ‘Intellectual Property Clause’ of the United States Constitution .......... 87
   B Patentable Subject Matter Under 35 USC § 101 ........................................ 89
   C Recognised Categories of Excluded Matter ................................................. 94
   D Novelty and Nonobviousness ..................................................................... 97
   E Description of the Invention ....................................................................... 98

III Supreme Court Decisions Involving Patentable Subject Matter ............. 99
   A Gottschalk v Benson ................................................................................... 99
   B Parker v Flook .......................................................................................... 106
   C Diamond v Chakrabarty ........................................................................... 110
   D Diamond v Diehr ...................................................................................... 112
   E Subsequent Supreme Court Authority on the Breadth of Section 101 ...... 117
   F Comment: Confusion as to Patent Eligibility Standards ......................... 118

IV The Federal Circuit Takes Over: A Cacophony of Views ......................... 121
   A The ‘Failed’ Freeman-Walter-Abele Test ............................................... 121
   B Arrhythmia ............................................................................................... 122
   C Schrader .................................................................................................. 124
   D Alappat .................................................................................................... 126
   E State Street ............................................................................................... 129
   F AT&T v Excel ............................................................................................ 136
   G The Impact of State Street and AT&T v Excel ....................................... 139
   H The Supreme Court Almost Weighs in: Laboratory Corp v Metabolite ... 143
   I Comiskey ................................................................................................... 148
   J Nuijten ...................................................................................................... 151
      1 The Majority in Nuijten ......................................................................... 152
      2 The Dissent of Circuit Linn J in Nuijten ............................................... 155
      3 Comment ............................................................................................... 160
## 4 - PATENTABLE SUBJECT MATTER IN AUSTRALIA

### I

**Patentable Inventions in Australia**

#### A

- **Constitutional and Legislative Framework**: 220
- **Statutory Requirements for Patentability**
  - **Patentable Subject Matter**: The ‘Manner of Manufacture’ Test: 226
  - **Novelty**: 228
  - **Inventive Step**: 229
  - **Usefulness**: 232
  - **Not Secretly Used**: 233
  - **The Threshold Requirement of Inventiveness**: 234
- **Exclusive Rights of the Patentee and Infringement**: 238
Physical Effect in Patent Law

D  Disclosure of the Invention to the Public.................................................. 239

III  The Concept of ‘Manufacture’ ........................................................................ 241
  A  Pre-NRDC Cases Discussing ‘Manner of Manufacture’ .................................. 242
     1  Boulton and Watt v Bull ........................................................................... 242
     2  The King v Wheeler.................................................................................. 246
     3  Cooper’s Application .............................................................................. 248
     4  Rogers v The Commissioner of Patents .................................................... 251
     5  Re C & W’s Application .......................................................................... 253
     6  Maeder v Busch ...................................................................................... 255
     7  Fishburn’s Application ........................................................................... 256
     8  Re GEC’s Application ............................................................................ 257
     9  The Cementation Company’s Application .............................................. 258
    10  Re Rantzen’s Application ........................................................................ 259
    11  Re An Application for a Patent by Bovingdon ........................................... 261
    12  Re Standard Oil Development Co’s Application ...................................... 262
    13  Re the Dow Chemical Company’s Application for a Patent ................... 264
    14  Re Elton and Leda Chemicals Ltd’s Application ...................................... 266
    15  Virginia-Carolina Chemical Corp’s Application ...................................... 267
    16  Rolls-Royce Limited’s Application ......................................................... 268
  B  NRDC........................................................................................................ 270
  C  Post-NRDC Cases Discussing ‘Manner of Manufacture’ ............................... 279
     1  Methods of Medical Treatment.................................................................. 279
     2  Computer Software .................................................................................. 284
     3  Business Methods ................................................................................... 294
     4  Biotechnology: Living Organisms and Genetic Materials .......................... 301
  D  General Inconvenience............................................................................... 302
  E  Observations to be Drawn From the Pre-Grant Case Law .............................. 306

IV  Non-Physical Inventions: The Grant Decision................................................. 311
  A  Facts and Decision .................................................................................... 311
     1  Patentable Subject Matter ........................................................................ 311
     2  Novelty .................................................................................................... 316
     3  The Threshold Requirement of ‘Invention’: The Use of Known Products .... 317
     4  Arguments of the Trial Judge, Branson J ............................................... 317
  B  Analysis of the Grant Decision .................................................................. 319
     1  The Physicality Requirement .................................................................... 320
     2  The Patentability of ‘Legal Discoveries’ ................................................... 323
     3  An Opinion as to How the Court Should Have Resolved the Manufacture Issue .................................................................................................................. 325
     4  What If the Alleged Invention Had Involved a Computer? ......................... 326
     5  Novelty, Inventiveness and the Threshold Requirement of ‘Invention’ ....... 327
     6  Implications of the Grant Decision ........................................................... 328

V  Lessons to be Taken From United States Law ................................................. 329
  A  The Recognised Categories of Excluded Matter ....................................... 330
  B  A Physicality Requirement is Not Good Law ............................................ 331
  C  United States Decisions Involving ‘Manufactures’ ...................................... 332
  D  Insignificant ‘Post-Solution’ or ‘Token’ Physical Activity is Not Sufficient 333

VI  Is a Technological Contribution Required?: The ‘Useful’ or ‘Technological’
     Arts and Industrial Applicability .................................................................. 334
     A  ‘Useful’ or ‘Technological’ Arts ............................................................... 334
     B  Industrial Application .............................................................................. 338

VII  The Remaining Strictures of Patentability ..................................................... 339
### LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ACIP</td>
<td>Advisory Council on Intellectual Property</td>
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<tr>
<td>ALRC</td>
<td>Australian Law Reform Commission</td>
</tr>
<tr>
<td>AUSFTA</td>
<td>The Australia – United States Free Trade Agreement</td>
</tr>
<tr>
<td>BCD</td>
<td>Binary-coded decimal</td>
</tr>
<tr>
<td>BPAI</td>
<td>Board of Patent Appeals and Interferences</td>
</tr>
<tr>
<td>CAFC</td>
<td>Court of Appeals for the Federal Circuit</td>
</tr>
<tr>
<td>CCPA</td>
<td>Court of Customs and Patent Appeals</td>
</tr>
<tr>
<td>EPC</td>
<td>European Patent Convention</td>
</tr>
<tr>
<td>EPO</td>
<td>European Patent Office</td>
</tr>
<tr>
<td>FOSS</td>
<td>Free and Open Source Software</td>
</tr>
<tr>
<td>GATT</td>
<td>General Agreement on Tariffs and Trade</td>
</tr>
<tr>
<td>IPAC</td>
<td>Intellectual Property Advisory Council</td>
</tr>
<tr>
<td>IPC</td>
<td>International Patent Classification</td>
</tr>
<tr>
<td>IPCRC</td>
<td>Intellectual Property and Competition Review Committee</td>
</tr>
<tr>
<td>JPO</td>
<td>Japan Patent Office</td>
</tr>
<tr>
<td>OSAPA</td>
<td>Open Source as Prior Art</td>
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<tr>
<td>PCT</td>
<td>Patent Co-operation Treaty</td>
</tr>
<tr>
<td>PTO</td>
<td>Patent and Trademark Office</td>
</tr>
<tr>
<td>TRIPS</td>
<td>Agreement on Trade-Related Aspects of Intellectual Property Rights</td>
</tr>
<tr>
<td>USPTO</td>
<td>United States Patent and Trademark Office</td>
</tr>
<tr>
<td>WIPO</td>
<td>World Intellectual Property Organization</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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STATEMENT OF ORIGINAL AUTHORSHIP

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

This thesis states the law as at 25 March 2010.

Ben McEniery
25 March 2010

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CHAPTER 1 - INTRODUCTION

I THE QUESTION THIS THESIS ADDRESSES

This thesis addresses one of the fundamental issues that remains unresolved in patent law today. It is a question that strikes at the heart of what a patent is and what it is supposed to protect. That question is whether an invention must produce a physical effect or cause a physical transformation of matter to be patentable, or whether it is sufficient that an invention involves a specific practical application of an idea or principle to achieve a useful result. In short, the question is whether patent law contains a physicality requirement.

This thesis highlights the lack of understanding we have of a core concept in patent law, namely the concept of ‘invention’. Resolving this issue will determine whether only traditional mechanical, industrial and manufacturing processes are patent eligible, or whether patent eligibility extends to include the non-machine implemented and non-physical products and processes that will be the basis of innovation in the Information Age. While most products and processes that produce a physical effect or cause a physical transformation will be presumed to be patentable subject matter,¹ there is a lack of consensus as to whether patent protection extends to non-physical products and processes or whether these are merely unpatentable abstract ideas. To this end, this thesis seeks to identify where the dividing line lies between patentable subject matter and the recognised categories of excluded matter, being the laws of nature, physical phenomena, and abstract ideas. It involves determining which technological advances are worth the inconvenience that monopoly protection causes the public at large and which should remain free for all to use without restriction. This is not a trivial task as there is much confusion and disagreement as to what the law actually is and what it should be.

¹ The terms ‘patentable subject matter’ and ‘patent eligible subject matter’ are synonymous and refer to subject matter that passes the threshold subject matter inquiry. The mere fact that an alleged invention may be ‘patentable subject matter’ or ‘patent eligible subject matter’ does not necessarily mean it is patentable. An alleged invention will only be a patentable invention if it is comprised of patentable subject matter, and is novel, inventive, useful and sufficiently described in the patent specification.
Whether patent law involves a physicality requirement is a matter of international significance with implications that extend beyond the jurisdictional limits of any single nation. Increasingly, competitive commercial advantage in today’s modern economies will come from new and innovative business processes, so it comes as little surprise that this issue has come to the fore at the dawn of the Information Age. In this sense, the thesis addresses the extent to which the modern commercial processes, business methods, services and non-physical products of the Information Age are patent eligible. While it is clear in Australia and the United States that business methods as a class are not excluded from patent eligibility, what is not clear is whether ‘pure’ business methods, devoid of any connection to the physical world, are patent eligible.

Resolving this issue will go a long way to determining whether property rights can exist in all new technological advances of the Information Age, or whether the role of the patent system is somehow limited to encouraging invention in the fields of technology traditionally recognised as patent eligible. Finding a solution is essential to the proper functioning of the patent system and is needed to bring legal certainty to this aspect of the law. Without certainty, innovation, and with it, productivity and standards of living, will suffer.

This is arguably the most prominent ‘live’ issue in patent law today. It was considered for the first time by an Australian court when the Full Court of the Federal Court of Australia decided the case of Grant v Commissioner of Patents³ (‘Grant’) in 2006, and by a United States court when the United States Court of Appeals for the Federal Circuit (‘Federal Circuit’) decided the case of In re Bilski⁴ (‘Bilski’) in 2008. It is currently on appeal before the United States Supreme Court, which is expected to hand down its decision in Bilski v Kappos, the appeal from Bilski, before the middle of this year. It is also anticipated that this is an issue that the High Court of Australia

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⁴ [2006] FCAFC 120 (Heerey, Kiefel and Bennett JJ). The applicant sought leave to appeal to the High Court of Australia, which was refused: Grant v Commissioner of Patents [2007] HCA Trans 126.
will need to consider in the future in order to ensure its patent jurisprudence remains consistent with international norms and principles of fairness and justice.

II THE RESEARCH IN CONTEXT

A Traditional Conceptions of the Role of Patentable Subject Matter

From its earliest days, the objective of patent law has been to encourage the introduction of new and useful technologies by providing incentives to invent and invest in innovation. While this statement seems uncomplicated, there is uncertainty as to exactly what new and useful products and processes the patent system does, and should, recognise as appropriate subject matter deserving the award of a patent monopoly.

Historically, people have considered the role of patents as being limited to the protection of novel and inventive mechanical devices and methods which involve the transformation of a physical article from one state to another. This traditional conception of the role of the patent system is inherited from mid-nineteenth century British law and is a concept that can be seen in the earliest cases dealing with

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6 The terms, ‘method’ and ‘process’ are used throughout this thesis interchangeably and without distinction between the two, which is reflective of common usage. The patentability of a process is usually considered to be independent of any apparatus with which the process is to be carried out: Cochrane v Deener, 94 US 780, 787-788 (1876) (‘That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result.’).
patentable subject matter. This traditional view of patentable subject matter is described by Federal Circuit Judge Mayer.

The patent system is intended to protect and promote advances in science and technology, not ideas about how to structure commercial transactions…

Affording patent protection to business methods lacks constitutional and statutory support, serves to hinder rather than promote innovation and usurps that which rightfully belongs in the public domain.

It would seem that these traditionally held notions are a consequence of our understanding of the concept of technology as being something grounded in tangible physical objects. For instance, it is said that in Thomas Jefferson’s day technology was readily identifiable: it was a physical substance with moving parts. If you put technology in a bag and shook it, it would make a sound.

The same cannot be said of technology nowadays. Today we find ourselves in the midst of a shift from the Industrial Age to the knowledge-based economy of the Information Age. A knowledge-based economy is one in which there is a greater reliance on intellectual capabilities than on physical inputs or natural resources. Knowledge-based economies are ‘those which are directly based on the production, distribution and use of knowledge and information.’ While manufactured products and manufacturing processes continue to be, and will likely always be, of great worth, we now see the knowledge products of the Information Age taking a larger market share.

The knowledge products of the Information Age include ways of manipulating data, data or information itself, and other intangible commodities that can be bought, sold...

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7 See for example King v Wheeler (1819) 2 B & Ald 345; 106 ER 392; Bently and Sherman, Intellectual Property Law, above n 5, 310.
8 In re Bilski, 545 F.3d 943, 998 (Fed. Cir. 2008) (Mayer J) (dissent).
and enjoyed electronically, such as music or computer software. We communicate with each other in multifarious ways at the push of a button or the click of a mouse. Friends, business associates or even strangers separated by great distances can speak to one another cheaply and simply. A victim of a natural disaster can communicate with the outside world using a mobile phone or twitter. A share trader has instant real-time access to share prices, analysis tools and price sensitive company and market data. We can download and listen to our favourite music and music from new bands on YouTube and MySpace. We can order and purchase just about any product imaginable online, from a pizza to an overseas holiday. Research scientists can access the latest data and theories from colleagues around the world via the Internet. As a consequence, our understanding of technology today is more broadly grounded in the discovery and creation of new and useful knowledge, information and ideas.

In many ways, the law’s understanding of what ought to be patentable has advanced to keep pace with technological progress. This has led to an erosion of what were formerly thought to be classes of subject matter excluded from patentability. We have seen claims to horticultural and agricultural methods, artificial living microorganisms, genetic materials and recombinant DNA techniques, methods of treating the human body, computer software and business methods all accepted as patentable subject matter. By observing this progression, we are slowly learning that excluding categories of invention from patentability is not what the courts intended.

The real challenge to traditional expectations as to the uses to which the patent system should be put arose when entrepreneurs in commerce and business began to seek the same patent protections that are awarded to engineers and industrialists.

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11 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252; Ex parte Hibberd, 227 USPQ (BNA) 443 (BPAI 1985).
Given the sudden interest in the patent system shown by entrepreneurs in commerce and business,\(^\text{17}\) it is of little surprise that the resulting expansion of the traditionally recognised scope of patentable subject matter created controversy. Patents in the United States now protect architectural methods,\(^\text{18}\) methods of managing the legal process,\(^\text{19}\) medical procedures,\(^\text{20}\) methods of psychological assessment,\(^\text{21}\) retailing methods,\(^\text{22}\) methods of conducting a business online,\(^\text{23}\) teaching methods,\(^\text{24}\) and methods of performing sports moves,\(^\text{25}\) such as methods of swinging a golf club\(^\text{26}\) and baseball training methods.\(^\text{27}\) As can be seen, patents of this nature are a long way from what is traditionally thought to be the domain of patent law. However, while the traditional expectations of what is patentable continue, the law does not definitively


\(^{19}\) United States Patent No. 5,875,431 (issued Feb. 23, 1999) (‘Legal strategic analysis planning evaluation control system and method’). This is a process to manage a client’s file that could be used in law firm.

\(^{20}\) United States Patent No. 5,950,633 (issued Sept. 14, 1999) (‘Microsurgical technique for cosmetic surgery’). This method sets out the physical steps a surgeon would take during a surgical procedure.

\(^{21}\) United States Patent No. 5,190,458 (issued Mar 2, 1993) (‘Character assessment method’). This is a psychological test for character assessment, derived from a drawing drawn by an individual being instructed to include in the drawing a number of set graphic symbols.

\(^{22}\) United States Patent No. 6,119,099 (issued Sept. 12, 2000) (‘Method and system for processing supplementary product sales at a point-of-sale terminal’). This is essentially a method of enticing customers to order additional food at a fast food restaurant instead of receiving change from a purchase.

\(^{23}\) United States Patent No. 5,794,210 (‘Method of rewarding those who view online advertisements’); United States Patent No. 5,948,061 (issued September 1999) (‘Method of delivery, targeting, and measuring advertising over networks’) (commonly known as the ‘DoubleClick patent’).

\(^{24}\) United States Patent No. 5,649,826 (issued July 22, 1997) (‘Method and device for teaching language’) This patent involves little more than teaching languages with the assistance of visual and audio stimuli recorded on some medium capable of storing data; United States Patent No. 6,015,947 (issued Jan. 18, 2000) (‘Method of teaching music’).


\(^{26}\) United States Patent No. 5,616,089 (issued Apr. 1, 1997) (‘Method of putting’); United States Patent No. 5,776,016 (issued July 7, 1998) (‘Golf putting method’); United States Patent No. 7,364,516 (issued April 29, 2008) (‘Golf exercising method’) (This method uses two lengths of resistance cord to provide resistance while a golf swing is emulated to strengthen the player who uses the method); United States Patent No. 6,692,369 (issued Feb. 17, 2004) (‘Training method for the game of golf’) (this invention relates to an apparatus for and method of stabilising the right knee while a golfer keeps his or knee locked during part of the golf swing); United States Patent No. 7,283,647 (issued Oct. 16, 2007) (‘Method and system for physical motion analysis and training of a golf club swing motion using image analysis techniques’).

tell us whether the scope of patentable subject matter is in fact limited in this way. As such, we lack a clear understanding of what patents protect, and consensus as to what it is that patents ought to protect.

**B The Concept of ‘Invention’ in the Information Age**

This thesis concerns the nature of invention and the scope of the concept, as recognised by the law. Dictionary definitions of ‘invention’ are of little assistance in determining whether non-physical inventions can be patented. The etymological origins of the word come from the Latin ‘invenire’, meaning to find, contrive or discover. According to ordinary usage, ‘to invent’ is to create or design something that has not existed before and is usually applied to a new method or device. In noun form, ‘Inventio’ describes a thing invented.28 These definitions do not reveal a physicality requirement, nor do they give an indication as to what part physical effect plays in invention, if any. The question of whether patent law contains a physicality requirement cannot be resolved merely by resorting to a definition of the term, ‘invention’. Instead, it requires an inquiry into the purpose and scope of patentable subject matter as it has evolved over time.

**III THE IMPORTANCE OF THE QUESTION THIS THESIS ADDRESSES**

**A Rampant Technological Innovation and Expanding Patentable Subject Matter**

As rampant technological advancement makes possible new types of useful devices and processes, patent standards need to evolve to ensure that patent law’s reward function continues to provide incentives for innovation. How the question this thesis addresses is resolved by the courts will determine whether the patent system remains forward-looking and capable of accommodating the new advances of the knowledge economy, or whether it will remain forged in the old technologies of an industrial era.

The consequences of finding that a particular type of innovation falls outside the bounds of patentable subject matter are that the rewards and incentives of the patent

system are not available to encourage innovation of that type, no matter how new, ingenious, or advantageous. The consequences of finding that a particular type of innovation falls within the scope of patentable subject matter are that the rewards and incentives of the patent system are available to protect innovations that exist within that area. Once it is recognised that those incentives exist, there is an incentive to disclose the workings of inventions of that type to the public. Once that disclosure occurs, new knowledge and information is placed in the public domain that can inspire and form the basis of further technological advances. Without these incentives, there is little impetus to disclose or even conceive of new technologies unless other elements of competitive advantage, such as a first mover advantage, exist.

A patent system that allows monopoly protection of products or processes not deserving of that protection will adversely affect the public interest, as will one that does not properly and fairly provide incentives to innovate. Having appropriate standards for patentable subject matter is important in order to maintain the delicate balance between promoting and rewarding innovation and allowing access to, and use of, knowledge. An effective system of property rights requires that those rights be clearly identifiable, enforceable and transferable with a minimum of transaction costs. For the efficacy of the patent system, it is imperative that we resolve the ambiguity that exists in relation to non-physical inventions and develop a clear understanding of the scope of patentable subject matter.

How the question this thesis addresses is resolved will affect the incentives that exist to create new and innovative methods and schemes of useful practical application in known fields such as financial services, business and commerce, educational instruction and law. This thesis addresses matters of particular significance for the use of patents in the service industries, from which we will find new novel and inventive intangible products and non-trivial multi-step processes emerging. Resolving the question this thesis addresses has considerable implications for the patentability of inventions that involve the manipulation of data or other information products or processes, which one might describe as knowledge inventions, whether implemented in software or not. It will determine whether patents are available over methods regardless of how they are implemented (say on a machine or not), or...
whether the presence of a machine, such as a computer, is a necessary element in an invention as claimed. The question is also such that it may cause us to reconsider whether computer software programs implemented on a general-purpose computer are really patentable subject matter.

The question is relevant to the patent system’s ability to respond appropriately to the emerging technologies in what are considered to be the next ‘big’ areas in innovation: nanotechnology; biotechnology (including bioinformatics); health sciences (including medical diagnosis, personalised medicine and neurotechnology); information technology and communications (particularly computer software, computer networks and telecommunications, distributed computing, ways of encrypting and decrypting information and computer security); environmental protection; and renewable energy production.\(^\text{29}\)

**B Patents in the Service Economy and Knowledge-Producing Industries**

This thesis is of relevance to the applicability of patent law to new developments in the service economy and knowledge-producing industries. While it is clear that new machines and other physical devices are patentable subject matter, processes represent an intellectually problematic type of invention. As the term ‘process’ is so broad, it includes almost any series of steps that a human or machine can perform, including those that describe human thought processes.\(^\text{30}\) Likewise, non-physical products are similarly problematic. Products and processes that lack any material or tangible form seem incongruent with established ideas about patent eligibility. This thesis questions whether the concept of invention can be sensibly be applied to describe both goods and services. In this respect, it is important to consider the differences between goods and services, and the misconceptions that exist in relation to the two, for the distinction between goods and services is not the same as the

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distinction between tangible and intangible products. Goods are distinct entities of economic value that can be owned. As such, they can be transferred or exchanged between market participants. They are entities that exist and can be consumed or used independently of their producers or owners. Services, on the other hand, are not separate entities that exist independently of their producers or consumers. A service is an act performed for the benefit of the consuming entity, which cannot be performed without its consent, agreement, co-operation and possibly active participation. While goods are most commonly thought of as being material or tangible objects, not all are. There are non-physical entities which have all the economic characteristics of goods that are not services, such as sound recordings, computer software, films, literary works and some patented methods.

Patent applications which give rise to this question include: an asset protection method utilising a trust to protect property from the claims of creditors (which is a method of applying the law in a particular way); a method of releasing equity in real property using a reverse mortgage; a method of compensating a manager in a manner that reduces incentives for collusion between competitors within an oligopolistic industry; a method by which a commodity provider could hedge risks associated with selling a commodity at a fixed price; and an encoded signal. These patent applications are clearly removed from the world of industrial application and are an attempt to extend the traditionally recognised scope of patentable subject matter to encompass processes that have no physical connection to the world, because they do not claim devices or machines and do not involve a physical transformation of matter.

32 Ibid 427 (‘They are the originals created by authors, composers, scientists, architects, engineers, designers, software writers, film studios, orchestras, and so on. These originals are intangibles that have no physical dimensions or spatial co-ordinates of their own and have to be recorded and stored on physical media such as paper, films, tapes or disks. They can be transmitted electronically. Like material objects, they are separate entities over which ownership rights may be established (and traded) and which may be of considerable economic value to their owners.’).
33 Grant v Commissioner of Patents [2006] FCAFC 120.
36 In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc).
37 In re Nuijten, 500 F.3d 1346 (Fed. Cir. 2007), cert. denied sub nom. Nuijten v Dudas, 129 S. Ct. 70 (2008); Re an Application for a Patent by Henry Barnato Rantzen (Rantzen’s Application) (1946) 64 RPC 63 (PAT).
C The Issue is Not One That Patent Applicants Can Easily Circumvent

The issue of whether patent law contains a physicality requirement is not one that can be dismissed as unimportant because it can be circumvented by a patentee adding a physical aspect to what otherwise might be unpatentable subject matter. At first blush, it would seem that the problem can be avoided by ensuring that any patent application filed incorporates a physical structure or device, or at the very least, is drafted in such a way so as to be tied to a physical structure or device. As will be revealed in the following chapters, the subject matter inquiry cannot be evaded in this way as courts are not amenable to patentees appending physical characteristics to an alleged invention that are no more than extra- or post-solution activity and not integral to its functionality. Secondly, a need to tie an invention to a physical device or transformation of matter may not properly represent the invention and may facilitate others inventing around the patent.

IV Why Some Courts and Commentators Favour a Physicality Requirement

Those in favour of a physicality requirement have argued that the risks of taking an overly inclusive view of patentable subject matter are that too many patents will issue on inventions that are commonplace and would appear even without patent incentives. Already, concerns such as these have come to the forefront of some commentators’ minds, who see recent patent law developments as stifling people’s ability to engage in commercial, research or even everyday domestic or recreational activities. For example, John Thomas notes that, ‘[a]s we read with amusement patent instruments claiming methods for swinging a golf club, treating cancer or administering a mortgage, we come to realize that the patent law seems poised to embrace the broadest reaches of human experience.’

A A Patent System in Crisis?

A physicality requirement is put forward as a means of distinguishing principles and abstract ideas from non-abstract processes, and distinguishing between the technological and the non-technological.\textsuperscript{39} However, it would seem that in many ways the courts’ reliance on a physicality requirement is a reaction to commonly held perceptions that the patent system is a system in crisis, and is seen as a means of mitigating the effects of its perceived failings.

Burk and Lemley see the reasons for the perceived crisis in patent law as being caused by: the flood of new patent applications filed each year; an over-burdened USPTO; the increasing number of patent law suits; and uncertainty as to the scope granted patent rights (where interpreting a patent has become a linguistic exercise which can only be conclusively resolved by going to court to have the claims interpreted and then having an appeal).\textsuperscript{40} Jaffe and Lerner see similar discontent and a perception that the patent system is in crisis in the persistent questions that are raised about patent quality, the increased cost and frequency of patent litigation, a perception that patents are an overall impediment rather than a boost to innovation, the competence of the USPTO (and by extension other patent offices) to properly apply the patentability standards of novelty and non-obviousness, uncertainty about the applicability of patent protection of new and emerging technologies, and scepticism about the patent system in developing countries that have the system thrust upon them by international treaties.\textsuperscript{41}

Many of the objections to allowing the scope of patentable subject matter to extend beyond the set of technologies traditionally recognised by the patent system are based on the premise that to do so will result in undesirable or undeserving patents being awarded. Proponents of a physicality requirement argue that it is necessary to prevent plainly invalid or otherwise undesirable patents being granted. There is no doubt that

\textsuperscript{39} In re Bilski, 545 F.3d 943, 954 (Fed. Cir. Oct 31, 2008) (en banc); In re Comiskey, 554 F.3d 967, 978 (Fed. Cir. 2009); Grant v Commissioner of Patents [2006] FCAFC 120, [31]-[32] (‘What Mr Grant’s method results in is at best an abstract, intangible situation... A physical effect in the sense of a concrete effect or phenomenon or manifestation or transformation is required. ... By contrast, the alleged invention is a mere scheme, an abstract idea...’); Bradley C Wright, ‘Business Method Patents: Are There Any Limits?’ (2002) 2 John Marshall Review of Intellectual Property Law 30, 39, 52; R Carl Moy, ‘Subjecting Rembrandt to the Rule of Law: Rule-Based Solutions for Determining the Patentability of Business Methods’ (2002) 28 William Mitchell Law Review 1047. 1084-1085.


the issuance of plainly invalid patents that claim known ideas, more than what the inventor actually invented, or overly vague or broad subject matter is a problem that must be addressed. A physicality requirement is thus employed at the subject matter threshold as a means of containing those effects by not allowing the bounds of patentable subject matter to expand beyond the industrial and mechanical technologies of yesteryear. Thus, the mischief that the proponents of a physicality requirement seek to remedy is founded upon a belief that patents should not be available to provide monopoly protection of supposedly ‘non-technological’ subject matter such as the management of relationships between people, commercial transactions or legal affairs.

On the other hand, the perceptions that there is a crisis in patent law could stem from an underlying belief that protecting subject matter that is inherently different to that traditionally recognised as patent eligible could create a different social meaning of patentable subject matter and signify a fundamental change in the objects of patent law. If there is consensus that the patent system exists to protect any kind of economically significant instantiation of an idea that can be described and replicated repeatedly by another human being, then the patent eligibility of non-physical inventions should not be contentious. Following this logic, as long as a claimed idea or instantiation of that idea can be repeated, it should be worthy of patent protection. On the other hand, if some argue that patent law has some other social meaning or objective and its subject matter test reflects that meaning or objective, the patent eligibility of non-physical inventions might be difficult to justify to all.42

B The Patent Examination Process and the Quality of Issued Patents

Observers of the patent system have rightly criticised the patent examination process and the quality of many issued patents. Those concerns are that too many undeserving patents are awarded for claims that are not novel, claims that lack a sufficient degree of inventiveness, and claims which are unduly broad. One concern is that many patents, particularly business method patents, protect methods already widely practiced, but are not rejected by patent examiners because those examiners are not

able, with the limited time and research resources at their disposal, to discover the prior art that justifies their rejection. Another is that in many patents, there is little correlation between what is disclosed in the patent specification and the broad claims that make up the patentee’s monopoly. The more extreme examples of demonstrably invalid patents are bizarre or disappointingly commonplace. The most notorious examples are probably the method using a laser pointer to exercise a cat, and the ‘method of swinging on a swing’ awarded to a five-year-old boy. Another is the Priceline.com reverse auction patent, which patented a Dutch auction as a business method. Further examples include, a sealed crustless sandwich, a system and method for fashion shopping, a system and method for providing reservations for restroom use, a method of designating dating status, a method of shaving, and a

43 United States Patent No. 5,443,036 (issued Aug. 22, 1995) (‘Method of exercising a cat’). This involved a ‘method for inducing cats to exercise consists of directing a beam of invisible light produced by a hand-held laser apparatus onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats, and to any other animal with a chase instinct.’

44 United States Patent No. 6,368,227 (issued April 9, 2002) (‘Method of swinging on a swing’). See Jeff Hecht, ‘Boy Takes Swing at US Patents’ (2002) New Scientist <http://www.newscientist.com/article.ns?id=dn2178> at 17 October 2007. With the help of his father, an attorney keen to demonstrate the absurdities of the modern patent system’s examination procedures, the boy claimed a method of swinging on a swing by inducing ‘side to side motion by pulling alternately on one chain and then the other.’ Following public ridicule, the Commissioner of Patents ordered reexamination and cancelled the patent.

45 United States Patent No. 5,794,207 (issued Aug. 11, 1998) (‘Method and apparatus for a cryptographically assisted commercial network system designed to facilitate buyer-driven conditional purchase offers’). The abstract provides, ‘The present invention is a method and apparatus for effectuating bilateral buyer-driven commerce. The present invention allows prospective buyers of goods and services to communicate a binding purchase offer globally to potential sellers, for sellers conveniently to search for relevant buyer purchase offers, and for sellers potentially to bind a buyer to a contract based on the buyer’s purchase offer. In a preferred embodiment, the apparatus of the present invention includes a controller which receives binding purchase offers from prospective buyers. The controller makes purchase offers available globally to potential sellers. Potential sellers then have the option to accept a purchase offer and thus bind the corresponding buyer to a contract. The method and apparatus of the present invention have applications on the Internet as well as conventional communications systems such as voice telephony.’

46 United States Patent No. 6,004,596 (issued Dec. 21, 1999) (‘Sealed crustless sandwich’). This patent discloses a sealed crustless sandwich which can be stored for long periods of time without a central filling leaking out. The sandwich includes a lower bread portion, an upper bread portion, an upper filling and a lower filling between the lower and upper bread portions, a centre filling sealed between the upper and lower fillings, and a crimped edge along an outer perimeter of the bread portions for sealing the fillings there between. The upper and lower fillings are preferably comprised of peanut butter and the centre filling is comprised of at least jelly. The centre filling is prevented from radiating outwardly into and through the bread portions from the surrounding peanut butter.

47 United States Patent No. 5,930,769 (issued 27 July 1999) (‘System and method for fashion shopping’). The method comprises receiving personal information from the customer; selecting a body type and fashion category based on the personal information; selecting fashions from a plurality of clothes items based on the body type and fashion category; outputting a plurality of fashion data based on the selected fashions; and receiving selection information from the customer.

48 United States Patent No. 6,329,919 (issued Dec. 11, 2001) (‘System and method for providing reservations for restroom use’). This IBM patent is a system that supposedly minimises the time
method of combing hair over a bald spot. There has even been a patent issued over a method for obtaining a patent.

C  Barriers to Entry

There is a concern that patents over non-physical inventions will create barriers to entry and stifle the legitimate business activities of ordinary citizens. Barriers of this nature include the need to license a plethora of patented prior art and the need for businesses to engage in extra due diligence to establish whether they have freedom to operate in a chosen field. For example, a person who wants to start a non-profit social-networking web site that is publicly available in all countries of the world, or a person who wants to implement a series of transactions to acquire an asset in a manner that hedges against fluctuations in price, both face the possibility that the activity infringes some unknown patent. While patents are published, given the astoundingly large number that exist and the difficulties in conducting a comprehensive due diligence, it is very difficult to ascertain whether conduct is an infringement.

D  Physicality: A Cure for Patent Law’s Woes?

According to some commentators, each class of technology is to be individually evaluated, and a decision is to be made as to whether, as a class, it is worthy of patent

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49 United States Patent No. 7,255,277 (issued Aug. 14, 2007) (‘Method of designating dating status’). This is a dating system and method that limits the embarrassment of rejection and minimises costs of implementation based on a market recognition of an external sign to be associated with a dating status such as a colour-coded bracelet. Arguably, teenagers have already established prior art that precludes the novelty of this ‘invention’.

50 United States Patent No. 6,014,975 (issued Jan. 18, 2000) (‘Shaving method’). The extent of this invention’s contribution to the sum of human knowledge is shaving with a razor which has been dipped in a bath of astringent liquid, such as witch hazel extract, and alcohol.

51 United States Patent No. 4,022,227 (issued May 10, 1977) (‘Method of concealing partial baldness’). This hair styling method involves dividing a person’s hair into three sections and carefully folding one section over another. It can only be presumed that this patent was filed as a joke.

52 United States Patent No. 6,049,811 (issued April 11, 2000) (‘Machine for drafting a patent application and process for doing same’). The patent is nothing more than a computer program that asks a user to input various data in a particular order that would ordinarily be included in a patent application. A patent application is compiled by combining the drafted sections with predetermined text.
protection. Following this line of thought, many have called for the elimination of non-physical methods as a class of patentable subject matter, presumably seeing them as undeserving of patent protection and such an approach as being a cure for patent law’s woes. The argument made in this thesis is that a physicality requirement is not a panacea for patent law’s woes, but is an approach that will have unintended adverse consequences for innovation and technological advancement. It is argued that to address patent law’s woes, the sources of the problems must be identified and dealt with individually.

V  METHODOLOGY, SCOPE AND CHAPTER OVERVIEW

This thesis is primarily a doctrinal legal study based on an examination of the law and the history of the patent system. Its primary aim is to test whether the current law as regards patentable subject matter involves a physicality requirement. It employs a jurisdiction-based chronological examination of how the principles of patent-eligibility have evolved over time and how are to be applied in circumstances involving non-physical inventions. That this is the necessary approach to take when investigating the scope and bounds of patentable subject matter in Anglo-Australian jurisdictions was demonstrated by the High Court in Australia in the watershed decision of National Research Development Corporation v Commissioner of Patents (‘NRDC’). There the court said that the question to be asked in determining whether an invention is a patentable subject matter is: ‘Is this a proper subject of letters patent according to the principles which have been developed for the application of s 6 of the Statute of Monopolies?’ That such an approach is valid when developing an opinion as to the current state of United States law was demonstrated in Bilski in the opinions of Dyk and Linn JJ, and Newman J in dissent. A secondary aim of the thesis is to test whether the opinions derived from the legal


54 (1959) 102 CLR 252 (Dixon CJ, Kitto, and Windeyer JJ).

55 Ibid 269.
doctrinal analysis it contains are supported on normative grounds. This secondary aim is to test whether the law as stated corresponds with broad notions of fairness and justice and continues to serve its objectives in light of modern technological advances.

Chapter 2 of the thesis commences with an examination of the history and theories of patent law to determine whether there is any historical or theoretical basis that supports a physicality requirement. In doing so it examines the degree to which the history of patent law and practice and the incentive theory of patent law continue to be of relevance today in the knowledge economy of the Information Age.

The core of the thesis then considers in detail the existing law in the United States and Australia. Chapter 3 addresses the various approaches that have been put forward in the United States to resolve the physicality issue and reviews the constitutional and legislative framework and case law. It gives an opinion as to how the issue ought be resolved under United States law, with a view to taking lessons that might inform an Australian approach. Chapter 4 examines the scope of patentable subject matter in Australia. The object of this chapter is to determine whether there is a physicality requirement under Australian law and how the position at law in Australia might be resolved.

There are three reasons why these two jurisdictions were chosen. The first is that their patentable subject matter tests are very similar and therefore are suitable for comparative analysis. Second, the United States was chosen because, as the world’s most technologically-advanced and litigious industrialised nation, its courts, more than others, are at the forefront of judicial consideration of issues that involve the intersection of emerging technologies and patent law. Lastly, United States patent law is of particular significance for an Australian audience because the courts in Australia have shown a willingness to follow United States decisions involving patentable subject matter issues.56

The law as regards patentable subject matter in the United Kingdom leading up to the commencement of the Convention on the Grant of European Patents\textsuperscript{57} (‘European Patent Convention’ or ‘EPC’) in 1977 is considered because of its persuasive influence on Australian law. However, the law in the European Union and the United Kingdom following the changes that ensued in 1977 is not considered because those changes made it fundamentally different to that in Australia and the United States. As a result of those changes, European and United Kingdom law differs from Australian and United States law in two important ways. Firstly, it requires that a patent be granted only for an invention that is capable of ‘industrial application’. Secondly, it contains an exclusory list of what are regarded as non-inventions that are not susceptible to patentability.\textsuperscript{58} Statutory limitations such as these are not found in Australia or the United States. Lord Justice Jacob, who gave judgment on behalf of the Court of Appeal (Civil Division) in Aerotel Ltd v Telco Holdings Ltd; Re


\textsuperscript{58} The ‘industrial application’ test and the exclusion of particular categories of subject matter have found statutory form in Europe and the United Kingdom by virtue of Art. 52 of the European Patent Convention, which is implemented in United Kingdom law by s 1 of the Patents Act 1977 (UK). Section 1 of the Patents Act 1977 (UK) provides as follows.

Patentable inventions.
1. — (1) A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say —
   (a) the invention is new;
   (b) it involves an inventive step;
   (c) it is capable of industrial application;
   (d) the grant of a patent for it is not excluded by subsections (2) and (3) below;

and references in this Act to a patentable invention shall be construed accordingly.

(2) It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of —
   (a) a discovery, scientific theory or mathematical method;
   (b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;
   (c) a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;
   (d) the presentation of information;

but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.

Section 4 provides that an invention shall be taken to be capable of industrial application if it can be made or used in any kind of industry, including agriculture, unless it is a method of treating a human or animal body by surgery, therapy or diagnosis. In addition, further exclusions follow in Article 53. Article 53 (a) excludes from patent protection ‘inventions the publication or exploitation of which would be contrary to “ordre public” or morality’ and 53 (b) excludes ‘plant or animal varieties or essentially biological processes for the production of plants or animals,’ but notes that the ‘provision does not apply to microbiological processes or the products thereof.’
Macrossan’s Application, explained that the legislative differences between Australian and current United Kingdom law would render meaningless any attempt to conduct a comparative law analysis between the two jurisdictions. There His Lordship, referring to the Australian decision of Grant v Commissioner of Patents said, ‘[t]he Australian legislation is different from that of Europe so the decision itself is of no relevance here – as is the fact that Mr Macrossan has been granted an Australian patent for his invention.’ The corollary must also be true, that as the European and United Kingdom law on patentable subject matter is so fundamentally different, it is of no relevance in Australia, hence, it is not considered.

After considering the position at law, the thesis addresses the normative issue of whether patent law should involve a physicality requirement. Chapter 5 addresses the issue of whether patent law should involve a physicality requirement from a normative perspective with the aim of determining whether such a limitation is an effective means of fostering invention and innovation in the ‘knowledge economy’ of the Information Age. This chapter: addresses the perceived crises that exists in patent law today and examines why some courts and commentators have favoured a physicality requirement as a means of addressing these crises; puts forward an argument as to what is an appropriate patentable subject matter test for the Information Age; and considers the likely impact a physicality requirement would have on various fields of technology.

Being a legal study, the overriding concern of this thesis is the content of Australian and United States patent law in light of the principles that have been set down in legislation and the case law. It is not an analysis of the merits of the patent system and does not consider whether Australia should have a patent system. As Machlup posited, in the absence of solid empirical evidence, it is not clear whether patents are a good thing. As such, it would be unwise to do away with the patent system now that it has been established: Fritz Machlup, An Economic Review of the Patent System (1958) US Senate, Committee on the Judiciary, 2d Sess, 21, 80. That this solid empirical evidence is still lacking, see: William M Landes and Richard A Posner, The Economic Structure of Intellectual Property Law (2003) 310 (‘Although there are powerful economic reasons in favour of creating property rights in inventions, there are also considerable social costs and whether the benefits exceed the costs is impossible to answer with confidence on the basis of present knowledge.’).
indicating that in most industries, patents are not an important part of the incentives firms have for investing in research and development, but takes no position as to the validity of this research or the persuasiveness of the conclusions drawn from it. Further, the thesis is not based on any systematic research into the rate of investment in particular forms of technology or other facts that would be pertinent to the question of the impact of the incentives of the patent system on investments in particular classes of technology. It is written on the basis that there is a patent system in existence in Australia, and in nearly all countries in the world and proceeds on the assumption that patent protection is an effective mechanism to create incentives to innovate and invest in innovation in all fields of technology.

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62 See for example: Edwin Mansfield, ‘Patents and Innovation: An Empirical Study’ (1986) 32(2) Management Science 173; Richard C Levin, etal, Appropriating the Returns from Industrial Research and Development, Brookings Papers on Economic Activity, Special Issue on Microeconomics (1987), 783-831; Richard R Nelson and J P Walsh Wesley M Cohen, Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not), NBER Working Paper 7552 (2000); James Bessen and Michael J Meurer, Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk (2008). In Levin, etal, the authors surveyed a large number of high-level R & D executives in over one hundred industries to identify their preferences between patents, secrecy, lead time, and other methods of protecting competitive advantage when releasing new processes and products. The authors found, albeit with significant inter-industry variances, that the executives in question generally did not view patents as the most effective means of encouraging innovation. Indeed, in some industries, patents were considered the least effective contributor to innovation. According to Bessen and Meurer, empirical economic evidence strongly rejects simplistic arguments that today’s American patent system spurs innovation and economic growth in all areas. Rather, they conclude that for the most part, the patent system does not achieve its stated goals, and to the contrary, the effectiveness of patents varies by industry and technology and for many industries and technologies that effectiveness is limited. They propose that only in some industries, such as the pharmaceutical and chemical industries, does patent law provide sufficient incentive to invest in innovation, but that in many other industries, and perhaps most, patents fail to achieve their stated aim and may actually discourage innovation. They hypothesise that the reason for this is that patents fail to provide clear and efficient notice of the boundaries of the rights granted. Bessen and Meurer opine that the average public firm outside the chemical and pharmaceutical industries would be in a better position if patents did not exist.

63 In many ways this is similar to the analytic approach taken in: Donald S Chisum, ‘The Future of Software Protection: The Patentability of Algorithms’ (1986) 47 University of Pittsburgh Law Review 959, 1013-1014.
CHAPTER 2 - HISTORY, PURPOSE AND THEORIES OF PATENT LAW

I INTRODUCTION

This chapter explores the history and evolution of patent law and the theories that explain its existence. Part II examines the patent system from its earliest days in the Republic of Venice and in England, to its adoption in countries such as Australia and the United States of America, through to the present day. Part III examines the incentive theory of patent law, which provides a rationale for the system’s existence. Finally, Part IV seeks to draw a link between the incentive theory of patent law, innovation theory and information economics and explain that the history of patent law and practice and the incentive theory of patent law continue to be of relevance during the knowledge economy of the Information Age. The overarching object of this chapter is to determine if the history and theories of patent law reveal whether purely non-physical inventions are, and should be, included within the bounds of patent eligible subject matter.

II HISTORY OF PATENT LAW

An understanding of the historical development of the patent system is necessary in the construction and interpretation of our patent laws. Since the integral elements of the patent system have been apparent since its inception, any discernible rationale for the existence of the patent system is to be found in both its history and present form.\(^1\) The history of the patent system reveals it to be a tool to promote innovation and economic development. From its earliest days, monopoly protection has been granted to those who disclose new technological advances that promote the progress of useful arts. Traditionally, this has been understood as being the domain of the industrial manufacturer, artisan, engineer and draftsman.\(^2\) As a consequence of this traditional

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understanding of the role of patents, the generally held expectation has been that patent protection is limited to innovation embodied in machines or other physical devices of industrial application and in manufacturing processes that involve manipulating or transforming physical matter. This traditional conception of the role of the patent system is inherited from mid-nineteenth century British law and is a concept that can be seen in the earliest cases dealing with patentable subject matter.\(^3\)

However, traditional conceptions of what patents protect, or should protect, are not necessarily identical to what the law regards as patent eligible. Conducting an historical analysis of the scope of patent eligibility is essential because at common law, patent eligibility is determined according to what the law has historically regarded as an invention.\(^4\) Whether traditional expectations as to what the patent system is to protect are to survive the onslaught of new technologies that are emerging at the inception of the ‘knowledge economy’ of the Information Age, or whether they are to be displaced by a broader notion that accommodates all new non-physical technological developments, will be determined by the law’s understanding of the concept of invention.

There are many significant sources, written mainly in the twentieth century, that reveal the early history and rationale of patent law.\(^5\) Those sources reveal that it is

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\(^3\) *The King v Wheeler* (1819) 2 B & Ald 345, 349; 106 ER 392, 394-395; *Diamond v Diehr*, 450 US 175, 184 (1981) (‘Industrial processes... are the types which have historically been eligible to receive the protection of our patent laws.’); Lionel Bentley and Brad Sherman, *Intellectual Property Law* (2nd ed, 2004) 310 (‘the image of the invention as the human intervention into nature that brings about a resulting physical change that underpins much contemporary jurisprudence, was well entrenched in British law by the mid-nineteenth century.’), 324.

often mistakenly thought that the origins of Anglo-Australian and United States patent law and the legal concepts of invention and inherent patentability lie in the English Parliament enacting the *Statute of Monopolies* 1624. The truth is that those origins predate the *Statute of Monopolies* and lie in the practice of the English Crown granting monopoly rights in inventions that arose prior to the passing of that statute, which itself was based on the early patent custom in the Republic of Venice.

**A. Early Patent Custom in the Republic of Venice**

The Republic of Venice is credited as being the first jurisdiction to issue patents for invention, which it did in the fifteenth century. European patent custom developed from the desire of rulers to encourage the development of new industries within their realms. The idea of granting monopolies originated in early European commerce to encourage individuals, companies and cities to engage in commercial ventures that entailed great risk. Monarchs bestowed trading monopolies upon individuals or guilds. Although concentration of these rights in a limited number of individuals may have allowed industries to regulate their members and impose quality controls, they certainly deprived the public at large from exercising these privileges. These trading

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6 21 Jam 1, Ch 3 (1623) (Eng).

7 Sherman and Bentely, *The Making of Intellectual Property Law: The British Experience, 1760-1911*, above n 1, 208-209 citing United Kingdom, *Parliamentary Debates*, House of Commons, 14 February 1837, 36 *Hansard* col. 555 (W Mackinnon MP) (“there was “no express statute according to which patents might be granted... the granting did not rest upon the foundation of statute law”).

monopolies were grants of exclusive rights to practise a certain art, or to make, use or sell a certain article, the object being the promotion of new industries that would provide the realm with new and useful products made domestically without the need to import.  

In Venice, as was the case throughout medieval Europe, commerce was dominated by guilds. Whoever proposed a new technology needed a specially created power or licence, called a privilege, to infringe existing monopolies in favour of the guilds in order to make, sell or use a new invention. The privilege was not necessarily given to an individual, but could be thrown open to the public, nor was it necessarily given to the inventor or first importer of a new art. A number of these patents were granted, an early example being the famous patent of 1469 granted to John of Speyer, a German printer, to protect the new art of printing that he introduced to the Republic. The patent ‘decreed that for five years next following there should be nobody whosoever who would, could, might or dare exercise said art of bookprinting in Venice and its territories, except master John himself.’ The patent referred to the reservation of exclusive rights ‘[i]n the same manner as usual in other useful arts.’ The rationale behind these grants was arguably that the rewards of monopoly protection and recognition given would act as an incentive to spur further innovation.

For a time, patents such as these were issued on a case-by-case basis before a general patent law was implemented. The earliest known general patent law is a Venetian statute of 1474 that granted a monopoly for 10 years to ‘every person who shall build

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10 The guilds were a group of masters maintaining a monopoly over a particular trade. This control was maintained by fixing prices and standards; trading collectively with other groups; defending their trade against others, including labourers and foreigners; and providing some security for aged and disabled members of the guild: see Prager, ‘A History of Intellectual Property from 1545 to 1787’, above n 5, 713.
12 Mandich, ‘Venetian Patents (1450-1550)’, above n 18, 169; Prager, ‘A History of Intellectual Property from 1545 to 1787’, above n 5, 715, 750 (extracted and translated in full). According to Prager, this was the first known patent of monopoly preserved in the records of Venice. There is a remark in the patent that it was a ‘usual’ practice to grant such monopolies.
13 Ibid.
The text of the Venetian statute of 1474 statute reads:

WE HAVE among us men of great genius, apt to invent and discover ingenious devices; and in view of the grandeur and virtue of our city, more such men come to us every day from divers parts. Now, if provision were made for the works and devices discovered by such persons, so that others who may see them could not build them and take the inventor’s honor away, more men would then apply their genius, would discover, and would build devices of great utility and benefit to our commonwealth. Therefore: BE IT ENACTED that, by the authority of this Council, every person who shall build any new and ingenious device in this City, not previously made in our Commonwealth, shall give notice of it to the office of our General Welfare Board when it has been reduced to perfection so that it can be used and operated. It being forbidden to every other person in any of our territories and towns to make any further device conforming with and similar to said one, without the consent and license of the author, for the term of ten years. And if anybody builds it in violation hereof, the aforesaid author and inventor shall be entitled to have him summoned before any magistrate the said infringer shall be constrained to pay him hundred ducats; and the device shall be destroyed at once. It being, however, within the power and discretion of the Government, in its activities, to take and use any such device and instrument, with this condition however that no one but the author shall operate it.

As Walterscheid demonstrated, the plain meaning of the translated text reveals all the fundamental features of today’s patent system, which indicates that this is the origin

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14 While it is generally regarded that the custom of granting patents originated in Italy, there is some question as to whether the practice began in Venice or Florence, see Walterscheid, ‘The Early Evolution of the United States Patent Law: Antecedents (Part 1)’, above n 5, 707. The Republic of Florence allegedly issued a patent to the architect and inventor, Filippo Brunelleschi in 1421 for his ship which transported the Carraran marble for the dome of the Florentine Duomo, however, it seems the practice was not continued: Bruce Bugbee, The Genesis of American Patent and Copyright Law (1967) 17-19.

15 Mandich, ‘Venetian Patents (1450-1550)’, above n 18, 176-177.
of modern patent law.\textsuperscript{16} This statute clearly involves the use of exclusive rights as an economic tool to encourage technological progress within the Republic. The rationale behind the enactment is the provision of an incentive to invent by prohibiting free-riding to protect the ‘inventor’s honor’ and presumably economic rights. It reveals novelty in protecting newly invented or imported devices not previously known within the city. It reveals inventiveness by use of the term ‘ingenious device’. It reveals utility in the form of a requirement that a device have ‘been reduced to perfection so that it can be used and operated’. There is a form of patent registration that provides a limited monopoly of ten years after which the device presumably falls into the public domain. There is an enforcement provision for actions against infringers that sets out a fine and provides for delivery up and destruction of offending articles. The patentee has the right to license the patented device. Finally, the state is given the option of a compulsory license, with the proviso that ‘no one but the author shall operate it.’ However, there is an expectation that an invention be manifested in the form of a physical ‘device’, so it is clear that it was not contemplated that patents would be granted for non-physical inventions under this early Venetian patent law.

The application of early patent law in Venice corresponded with the height of economic prosperity in the Republic from 1400 to 1550. Venice’s economic prosperity and superiority were due to her being a dominant sea power in control of the then known major trade routes. That superiority dissolved with the discovery of new sea routes to the Far East around the Cape of Good Hope at the end of the fifteenth century. This marked the reversal of migration of skilled tradesmen and artisans, particularly glass workers, who had in the past moved to Venice, but later sought other parts of Europe, taking with them knowledge of Venice’s patent custom. Following this migration, the use of grants of exclusive rights by governments to encourage inventive industry and the introduction of new technology emerged concurrently in several areas in Western Europe in the fifteenth and sixteenth centuries.\textsuperscript{17}


Following the Venetian patent statute of 1474, similar systems were adopted in Germany, France, the Netherlands and England between 1500 and 1550. By the end of the eighteenth century England, France and the United States had statutory patent systems.

B. The Early English Patent Custom

The origins of Anglo-Australian and United States patent law and the legal concepts of invention and inherent patentability lie in the custom of the English Crown awarding grants of monopoly rights by letters patent (literally meaning ‘open letters’) in exercise of the Royal prerogative to produce specific goods or provide specific services.

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19 France passed a patent law in 1791. In the United States of America, Congress passed its first patent statute in 1790 and its second shortly thereafter in 1793. Inventors could obtain patent protection as a matter of right merely de facto in England but de jure in France and the United States. During the next half century the patent system was embedded in statutory form in other countries. Patent laws were enacted in Austria in 1810, Russia in 1812, Prussia in 1815, Belgium and the Netherlands in 1817, Spain in 1820, Bavaria in 1825, Sardinia in 1826, the Vatican State in 1833, Sweden in 1834, Württemberg in 1836, Portugal in 1837 and Saxonia in 1843: Fritz Machlup and Edith Penrose, ‘The Patent Controversy in the Nineteenth Century’ (1950) 10 Journal of Economic History 1, 2-3. Machlup and Penrose record the first patent statute in the United States as having been passed in 1793. While there was a Patent Act passed in 1793 in the United States, it was not the first. The first was the Patent Act of 1790 Ch. 11, § 1, 1 Stat. 109. See Graham v John Deere Co., 383 US 1, 6 (1966); Walterscheid, ‘The Early Evolution of the United States Patent Law: Antecedents (Part 1)’, above n 5, 698. For United Kingdom legislation, see Patents, Designs & Trade Marks Act 1883 (UK) 46 & 47 Vict c 57.

20 Letters patent are a particular form of instrument by which the wishes and commands of the Crown are made known to the public at large or to the particular individuals concerned: Prestige Group (Australia) Pty Ltd v Dart Industries Inc (1990) 26 FCR 197, 214.

21 2 William Blackstone, Commentaries on the Laws of England (Robert M. Kerr ed., 4th ed., 1876) (1768) 316-317 (‘The king’s... grants, whether of land, honors, liberties, franchises, or aught besides, are contained in charters, or letters patent, that is, open letters, literae patentae: so called, because they are not sealed up, but exposed to open view, with the great seal pendant at the bottom; and are usually directed or addressed by the king to all his subjects at large.’). In contrast to the open letters of letters patent were letters close. Monarchs in England did much of the business of the state by means of charters, letters patent, and letters close. Letters patent were used to set forth their public directives, whereas letters close were used to provide private instructions to individuals.
The early English patent custom reveals that patents were introduced as a tool of industrial innovation policy designed to bring new trades, industries and devices to the realm. However, these were not patents as we understand them today. Although today we understand patents to be a grant of property rights, they were not always crafted in that way. They were certainly not awarded as of right, or in recognition of a pre-existing natural right. In earlier times English patents were grants of privileges bestowed according to the Royal prerogative. These were simply royal licences to allow the recipient to operate in an area that was otherwise within the monopoly control of one of the guilds. Patents were awarded at the request of the petitioner and granted by the grace of the monarch. As they were privileges rather than property rights, they could be revoked at any time without reason. While the award of a patent may in effect have been a just or fair recognition of innovative effort to bring a new technology to the community, this is merely a by-product of its function as a tool of industrial or innovation policy.\textsuperscript{22} Patents were not only granted for invention. British monarchs were also in the habit of granting other monopolies, especially in the form of exclusive rights to trade in a foreign area.\textsuperscript{23}

During the Middle Ages the industrial achievements of the English were inferior to those of proximate countries such as France, Germany, Italy, Spain and the Netherlands. This remained the case at least until the middle of the sixteenth century, during which England was largely a pastoral, agricultural and mining community dependent on imports of manufactured items in exchange for its raw cloth, wool, hides, tin and lead. In order for the English economy to flourish, technological advancement beyond subsistence or localised commodity production was needed. From this desire, the early English patent custom emerged. To modernise the economy, the state attempted the gradual stimulation of the production and circulation of commodities in those sectors of the economy where it could act without disturbing powerful vested interests. Letters patent were used to attract skilled tradesmen to work in England and as a tool of regional economic and technological development. Beginning in the fourteenth century, King Edward III issued letters


\textsuperscript{23} For example, rights to trade in parts of the known world were allocated to the Merchant Venturers, the Russia Company (1553), the Levant Company (1581) and the East India Company (1600): Jill McKeough, Andrew Stewart and Philip Griffith, \textit{Intellectual Property in Australia} (3rd ed, 2004) 303.
patent to foreigners willing to come to England to train subjects in their respective trades in key domestic industries. The earliest known example of a royal grant to foreigners of this nature is the grant to Johanis Kemp and his Flemish weavers in 1331 to encourage them to work in England. Later examples include patents issued for the milling of soap and the manufacture of saltpetre, an improvement in knife handles, a grinding mill, dredging machines, ovens and furnaces, and a knapsack.

However, it was not until the reign of Queen Elizabeth I (1558-1603) during the middle of the 16th century that we find a truly modern patent grant, which involved the Crown issuing letters patent to individuals for manufacturing monopolies.

C. Patents Under Elizabeth I

From early in her reign, Queen Elizabeth I pursued an innovation policy to enable England to attain economic power and strength relative to other nation states. The view taken was that the Crown’s role was to regulate commerce and industry in such a way as to favour the creation of new industries and trades. This was to be achieved by stimulating the domestic production of raw and manufactured goods and to foster the creation of local industries to manufacture products that would otherwise have been imported. Elizabeth’s innovation policy focussed on introducing new trades and industries to the realm and avoiding interference with existing trades and industries and the livelihoods of the established workforce. This view is substantiated by Lord Coke’s argument against monopolies made at the time.

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[A] mans trade is accounted his life, because it maintaineth his life; and therefore the monopolist that taketh away a mans trade, taketh away his life, and therefore is so much the more odious.\textsuperscript{29}

For Elizabeth, innovation meant bringing new technology to the realm, rather than invention. Patents were granted both to new inventors (as we understand the term to mean today) and those who first introduced an invention into the realm through importation. Thus, the early English patent custom reflects mercantilist ideas by focussing on providing incentives to merchants who had the contacts and the capacity to bring new technologies to England. According to Hulme, the term, ‘inventor’ was used to denote the person importing a new art into the realm or the first finder or creator of a new product or process, the rights of the inventor being derived from those of the importer.\textsuperscript{30} Use of the phrase, ‘invention and a new trade’ was used to mean the importation of a new trade or industry, whereas the term ‘discovery’ was used to mean what we in contemporary language describe as an ‘invention’, being the use of inventive mental facility to produce something new and non-obvious.\textsuperscript{31}

The rule that the term ‘inventor’ included the first importer of patentable ideas was laid down in the early case of \textit{Edgeberry v Stephens},\textsuperscript{32} and followed in \textit{Boulton and Watt v Bull}.\textsuperscript{33} The rationale behind allowing patents to issue in favour of importers was that the service done to the realm warranted an exception from the general rule

\textsuperscript{29} Edward Coke, \textit{3 Institutes of the Laws of England} (1628) 181.
\textsuperscript{30} Hulme, ‘The History of the Patent System under the Prerogative and at Common Law’, above n 5, 151-152.
\textsuperscript{32} (1697) 2 Salkeld’s Reports 447.
\textsuperscript{33} (1795) 1 H Bl 463; 126 ER 651 (CP). In \textit{Boulton and Watt v Bull}, Eyre CJ held that \textit{Edgeberry v Stephens} ‘establishes, that the first introducer of an invention practised beyond the sea, shall be deemed the first inventor; and it is there said the act is intended to encourage new devices useful to the kingdom and whether acquired by travel or study, it is the same thing.’ He continued to say that ‘this construction is now universally accepted in our courts’, and argued, ‘Whether this construction be logically correct is not material; but it is of greatest importance for the improvement of the trade of the realm that all possible encouragement should be given to the introduction of discoveries useful to man from every region of the globe’: 665-666. See also \textit{Moser v Marsden} (1893) 10 RPC 350, 359 (Lindley LJ) (‘The Patentee is the true and first inventor within the meaning of the Patent Law, whether he invents himself, or whether he simply imports a foreign invention.’).
that monopolies were not to be granted. Encouraging entrepreneurs to assume the costs and risks associated with introducing a new trade or industry required a powerful incentive in the form of the potential to earn a substantial economic return without causing substantial costs to be incurred by the Crown. A critical component of the policy was the acquisition of superior technology from the Continent, particularly technology that figured in the products most frequently imported into the Kingdom. Thus, monopolies were primarily granted for the importation of new industries and many went to aliens or naturalised subjects of the Crown. Patents were not awarded in recognition of some natural right in favour of an inventor to control the use of his or her ideas.

The industrial policy of the time and the rationale behind the Crown granting these monopoly rights can be inferred from the conditions attaching to the grants. Whether the policy was achieved in practice is another matter. Failure to comply with conditions attaching to a grant constituted grounds for revocation of the patent in any action for a writ of seire facias. Generally, conditions would require the grantee to undertake not only to introduce the new art, trade or industry, but also to practise or work it in the Kingdom within a specified time, which might have been as short as two months or as long as three years. Another requirement was that the patentee employ and train local English artisans to practise the art that was the subject of the grant, for the purpose of assuring the establishment of the industry in England and to boost employment. These conditions were often supplemented with a limit on the number of foreigners the patentee might use as partners or employees. Many grants also contained clauses demanding a minimum manufacturing output and that commodities produced must be of good quality and cost less than imported equivalents. As the reign of Elizabeth I progressed, a more general revocation clause came into use allowing the Crown to revoke a patent granted for what is broadly described as its ‘inconveniency’, which was designed to prevent monopolies that

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34 Marsden v Saville Street Co (1878) 3 Ex 203, 206; Plimpton v Malcolmson (1876) 3 Ch D 531, 555-556 (George Jessel MR); In re Wirth’s Patent (1879) 12 Ch D 303, 304; In re Avery’s Patent (1887) 36 Ch D 307, 316-317.
36 Lahore, ‘The Legal Rationale of the Patent System’, above n 18, 13-14, MacLeod, above n 5, 53. See also Mossoff, above n 5, 1256-1257.
Physical Effect in Patent Law

would impede employment and make men idle.\(^{37}\) A patent grant was made under the royal prerogative, and was therefore entirely at the discretion of the Crown.\(^{38}\) The Crown was also free to revoke a patent, as it was expected to do if the monopoly were found to be prejudicial to the common good. According to Lahore, from this early patent practice of the early seventeenth century we see the basic features of our modern patent system.\(^{39}\)

While many of the grants made under the exercise of the Royal prerogative by Elizabeth I and James I were genuinely intended to encourage new and useful arts, many were said to be an abuse of that power to reward royal favourites. There were also arguments that the Crown granted patents excessively and undeservedly as a means of generating income for itself. It was alleged that in practice the Crown granted monopolies for the making or importing of products regardless of whether the patentee was the inventor or had brought a new product into the realm. Often these monopolies were granted in relation to commodities already in use. Sometimes monopolies were created over necessities such as salt, starch, saltpetre, paper and glass, thereby harming the existing trade in known commodities. According to many commentators, the problem of odious monopolies\(^{40}\) arose from the Crown granting monopolies as favours for relatives and courtiers.\(^{41}\) While it is clear that the Crown used patent monopolies as a revenue source by way of a bargain with the patentee that the Crown would receive part of the profits arising from the monopoly or by annual rents, it is by no means clear that such behaviour was the sole, or even a dominant rationale for the existence of a patent system. According to one commentator, the ‘financial returns to the Crown were at the most negligible, and, while it may be admitted that fiscal policy and the hope of raising revenue were contributing factors, they were not the main nor even an important motivating force’.\(^{42}\) Some sought to place blame on unscrupulous patentees deceiving the monarch so as to grant unworthy patents and then abusing the powers given under


\(^{40}\) ‘Odious monopolies’ are monopolies over things already known or used.

\(^{41}\) Holdsworth, above n 5, 347; Federico, above n 5, 299; Schaafsma, above n 1, 245; Lahore, ‘The Legal Rationale of the Patent System’ above n 18, 11; Bugbee, above n 14, 37.

\(^{42}\) Fox, above n 5, 188.
those grants. Others have argued that the complaints against the patent system were a result of a decline in prosperity in the last decade of the sixteenth century and the first impulse was to seek redress from real or imaginary abuses including the grant of monopolies. Whatever the reason, it was perceived that the cost of commodities under monopolies increased significantly and that monopolies became a hindrance to trade and a burden on the people.

Outrage at what were perceived as the Crown’s abuses was expressed in 1601 during Elizabeth’s last Parliament. The struggle that ensued between Parliament and the Queen was one of the most significant in English constitutional history. At stake were the royal prerogative and its pre-eminence over the power of Parliament. The struggle was temporarily stayed when Elizabeth I issued a proclamation in Parliament that revoked a great number of objectionable patents and gave the common law courts the power to determine the validity of monopolies granted by the Crown. Her Majesty thereby abandoned her claim to settle disputes arising from the grant privileges under the royal prerogative and even showed indignation that she had been tricked into making such grants. That, however, was not the end of the matter, as the common law was soon called upon to address the issue.

It was the grant to a groom of Queen Elizabeth’s Privy Chamber, Edward Darcy, that led to the first common law judicial decision to challenge the nature of the Crown’s power to grant monopolies and the nature and power of the royal prerogative. The case was Darcy v Allen (also known as The Case on Monopolies). It involved the grant of an exclusive right issued in 1598 to Edward Darcy to manufacture, import and sell playing cards in England and its dominions, even though the manufacture of playing cards was an established industry. Many vigorously infringed the monopoly.

46 Jacob I Corré, ‘The Argument, Decision and Reports of Darcy v. Allen’ (1996) 45 Emory Law Journal 1261, 1261. The fame of Darcy v Allen is largely due to the reports of Sir Edward Coke: (1603) 11 Coke Rep 84b, 77 Eng Rep 1260. Coke appeared as Attorney-General before the Kings Bench in Darcy v Allen, was one of the reporters of the case and was involved in drafting of the Statute of Monopolies. Two other reports exist: (1603) 72 Eng Rep 830 (Moore 671); (1603) Noy 173, 74 Eng Rep 1131. The case has also been referred to as ‘Darcy v Allin’ or ‘Darcy v Allein’.
When Allen, a London haberdasher infringed the patent, Darcy brought suit. Allen admitted selling the cards, but pleaded a right to do so. It was argued on behalf of the patentee that the Crown had the sole prerogative in matters of pleasure and recreation and that the grant had been given to control the number of playing cards in circulation and the time spent by servants and apprentices playing cards. The King’s Bench decided the case in the Easter term of 1603 after the Queen’s death in 1602. A verdict against Edward Darcy in favour of the defendant, Allen was given.

No written opinions were given, perhaps because the common law courts at the time were reluctant to articulate the principles on which the validity of impugned grants were to be judged. In the absence of reasons, counsel’s argument for the defence was reported in full and is regarded as being representative of the court’s reasoning. The report reveals that, as a rule, monopolies were stated to be generally contrary to law because they are not for the benefit of the realm, raise prices, reduce the merchantability of goods and reduce employment.\(^{47}\) However, an argument made on behalf of the defendant expressed one exception to the rule against monopolies that has become a classic principle. That exception was made in favour of monopolies for invention and importation, limited in duration.

> [W]hen any man by his own charge and industry, or by his own wit and invention doth bring any new trade into the realm, or any engine tending to the furtherance of a trade that never was used before; and that for the good of the realm; in such cases the king may grant to him a monopoly-patent for some reasonable time, until the subjects may learn the same, in consideration of the good he doth bring by his invention to the commonwealth, otherwise not'.\(^{48}\)

It is said that the arguments put to the court reflect the common law principles relating to monopolies and have formed the basis of patent systems in England, its dominions, the United States, and many other foreign states.\(^{49}\)

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\(^{49}\) Lahore, ‘The Legal Rationale of the Patent System’ above n 18, 11-12 citing Fox above n 5.
The Clothworkers of Ipswich,\textsuperscript{50} decided in 1615, was the second important case decided before the passing of the Statute of Monopolies, in which the common law courts had an opportunity to deal with the limits of the prerogative to grant patents. In this case, a group of tailors incorporated and chartered by King James I to conduct their business in Ipswich brought an action against a tailor who was not part of the corporation but nonetheless practiced his trade in the town. The court stated that the Crown could create corporations with power to make ordinances governing trade, but the power granted did not extend to the creation of a monopoly harmful to free trade. The case report reads as follows.

[I]t was agreed by the Court, that the King might make corporations... but thereby they cannot make a monopoly for that is to take away free-trade, which is the birthright of every subject.... But if a man hath brought in a new invention and a new trade within the kingdom, in peril of his life, and consumption of his estate or stock, &c. or if a man hath made a new discovery of any thing, in such cases the King of his grace and favour, in recompence of his costs and travail, may grant by charter unto him, that he only shall use such a trade or trafique for a certain time, because at first the people of the kingdom are ignorant, and have not the knowledge or skill to use it: but when that patent is expired, the King cannot make a new grant thereof: for when the trade is become common, and others have been bound apprentices in the same trade, there is no reason that such should be forbidden to use it.\textsuperscript{51}

According to Mossoff, the judgment contains all the conditions necessary for the grant of letters patent in the mid-sixteenth century, namely that: the justification for the monopoly is that new industries are introduced into the realm and that no monopoly can issue for pre-existing industries; the monopoly rewards the labour and costs of the inventor; the patentee is to train Englishmen in the trade; and that patents

\textsuperscript{50} (1615) Godbolt 252; 78 ER 147 (King’s Bench) (the case is otherwise known as \textit{The Case of the Taylors of Ipswich}).

\textsuperscript{51} (1615) Godbolt 252, 253-254; 78 ER 147, 148 (King’s Bench).
are royal grants of privilege given solely for the purpose of achieving policy objectives based upon the common good.\textsuperscript{52}

D. The Statute of Monopolies

James I, who succeeded Elizabeth in 1603 shortly before \textit{Darcy v Allen} was decided, was caught in the same struggle on the question of monopolies as his predecessor. His needs and those of his courtiers demanded that patents be freely granted, while Parliament, in contrast, demanded their regulation. Notwithstanding the outcome in \textit{Darcy v Allen}, James continued issuing odious monopolies over existing trades and products. In the face of continuing political pressure, James issued in 1610 a ‘Declaration of His Majesty’s Pleasure’ which became known as the \textit{Book of Bounty}, which is said to have provided a statement acknowledging the common law principles arising from the reports in \textit{Darcy v Allen}.\textsuperscript{53}

Shortly thereafter, in May 1624, Parliament enacted the \textit{Statute of Monopolies}.\textsuperscript{54} The \textit{Statute of Monopolies} reflected the common law’s suspicion of monopolies, but recognised nonetheless that monopolies limited in duration have the potential to serve the public interest by providing an incentive to invent. The principal purpose of the \textit{Statute of Monopolies} was to declare all grants of monopolies void,\textsuperscript{55} other than patents for invention, which it allowed for a limited duration. From a constitutional perspective, the \textit{Statute of Monopolies} represents an incredible assertion of Parliamentary power and an assertion that the Kingdom was to be ruled by common law, rather than royal prerogative.\textsuperscript{56}

\textsuperscript{52} Mossoff, above n 5, 1270.
\textsuperscript{53} Fox, above n 5, 96-97.
\textsuperscript{54} 21 Jam 1, Ch 3 (1623) (Eng). The \textit{Statute of Monopolies} is the short title of the Act. The long title is ‘An Act Concerning Monopolies and Dispensations with Penal Laws and the Forfeiture Thereof’.
\textsuperscript{55} Section 1 of the \textit{Statute of Monopolies} provides that the central objective of the statute is to encourage free trade and competition by rendering void all monopolies, including those granted under the authority of letters patent. Section 1 provides: ‘All monopolies and all commissions, grants, licenses, charters and letter patent theretofore made or granted or heretofore to be made or granted to any person or persons, bodies politic or corporate whatsoever, of or for the sole buying, selling, making or using of anything within this realm… are utterly void and of no effect.’
\textsuperscript{56} According to Dent, the \textit{Statute of Monopolies} was a political compromise that was in the interests of both the Crown and the Parliament: Chris Dent, “Generally Inconvenient”: The 1624 \textit{Statute of Monopolies} as Political Compromise” (2009) 33(2) \textit{Melbourne University Law Review} 415.
The object of the passing of the *Statute of Monopolies* is said to be the curtailment of the practice of the Crown in granting monopolies to court favourites in goods or businesses which had long before been enjoyed by the public, a practice considered to be contrary to the common law. Thus, the *Statute of Monopolies* was little more than a declaration of the common law principles then in existence, with the exceptions that it fixed a maximum term of fourteen years and transferred jurisdiction for hearing patent disputes from the Exchequer to the common law courts.

Section 6 of the *Statute of Monopolies* set out the exception in favour of patents for invention and the conditions to be satisfied in order for a patent to be granted. The statute provided that the prohibition against monopolies:

> shall not extend to any [letters] Patents and Graunt of Privilege for the tearme of fowerteene yeares or under, hereafter to be made of the sole working or makinge of any manner of new Manufactures within this Realme, to the true and first Inventor and Inventors of such Manufactures, which others at the tyme of makinge such [letters] Patents and Graunts shall not use, soe as alsoe they be not contrary to the Lawe nor mischievous to the State, by raising prices of Commodities at home, or hurt of Trade, or generallie inconvenient …

The *Statute of Monopolies*, making reference to a ‘grant of privilege’, did not change the position at law of applicants, who did not have a right to be granted a patent, but were still in the position of a petitioner seeking the monarch’s favour and were not granted property rights. Likewise, the words ‘true and first inventor’, referred to the

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58 Hulme, ‘The History of the Patent System under the Prerogative and at Common Law’, above n 5, 151-152; Hulme, ‘The History of the Patent System under the Prerogative and at Common Law - A Sequel’, above n 5, 44; Lahore, ‘The Legal Rationale of the Patent System’ above n 18, 15; Justine Pila, ‘The Common Law Invention in its Original Form’ (2001) *Intellectual Property Quarterly* 209, 223; Federico, ‘Origins and Early History of Patents’, above n 5, 302-303; Inlow, above n 5, 31; Fox above n 5, 115-118, 125. It is not known why the term of 14 years was chosen, but it is probably the sum of two seven-year apprenticeship terms, as it was often the case that one of the conditions attached to the patent was an undertaking by the patentee to train apprentices in the invention. Once the patent owner had trained two cohorts of apprentices, the invention could be freely used by all, which emphasises that importing new skills was a focus of the system: Walterscheid, ‘The Early Evolution of the United States Patent Law: Antecedents (Part 2)’, above n 5, 867 n 111 citing Coke, 3 *Institutes of the Laws of England* (1628) 184 (Coke favoured a term limited to one apprenticeship period of seven years); Federico, ‘Origins and Early History of Patents’, above n 5, 304; Hulme, ‘The History of the Patent System under the Prerogative and at Common Law’, above n 5, 153-154.
person responsible for the introduction of the invention into England. Coke, writing contemporaneously, explained the reasoning behind the sort of monopoly permitted by section 6 of the Statute of Monopolies as being:

because the inventor bringeth to & for the Commonwealth a new manufacture by his invention, cost and charges, and therefore it is reason, that he should have a privilege for his reward (and the encouragement of others in the like) for a convenient time.\textsuperscript{59}

Here we have a contemporaneous statement of one involved in the drafting and passage of the Act that describes the incentive function of patent law. In fact, it is clear that even from these early times there was an inextricable link between offerings of rewards and incentives to act to bring new inventions to the realm.

The Statute of Monopolies did not narrow or eliminate categories of eligible subject matter. It addressed only patent abuses.\textsuperscript{60} It was directed at outlawing ‘odious monopolies,’ such as patronage grants and favours to friends of the Crown. In this way, it left the existing common law intact.\textsuperscript{61} Under the common law set out in Darcy v Allen, patents could only be invalidated if they were generally inconvenient for interfering with established industries and trades. These requirements were adopted in the language of the Statute of Monopolies. Therefore, it cannot be said that the Statute of Monopolies restricts the kinds of new processes that can be patent eligible today merely because it outlawed patents on non-novel businesses in England. As such, business methods, non-physical methods or methods of organising human activity were not removed from the scope of patentability by the passing of the Statute of Monopolies.\textsuperscript{62}

\textsuperscript{59} Coke, Institutes of the Laws of England, above n 29, 184.
\textsuperscript{60} Prager, ‘Historical Background and Foundation of American Patent Law’, above n 5, 313 (‘The statute said nothing about meritorious functions of patents, nothing about patent disclosures, and nothing about patent procedures; it was only directed against patent abuses.’); Klitzke, above n 5, 649; Graham v John Deere Co., 383 US 1, 5 (1966).
\textsuperscript{61} National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 268-269; Grain Pool of Western Australia v Commonwealth of Australia (2000) 202 CLR 479, 500 (‘The Statute of Monopolies of 1623 had purported to be declaratory of the common law by indicating the limitations established by the common law upon the exercise of the prerogative of the Crown to grant monopolies.’).
\textsuperscript{62} In re Bilski, 545 F.3d 943, 985-989 (Fed. Cir. 2008) (en banc) (Newman J) (dissent); In re Comiskey, US App. LEXIS 400 (Fed. Cir. 2009) (en banc) (Newman J) (dissent) 49-55. A near-
The *Statute of Monopolies* governed English patent law for more than 200 years and it was not until the passing of the *Patent Law Amendment Act 1852* (UK) that England received significant patent law legislation. The *Statute of Monopolies*, however, continued to be of relevance as it was never repealed and, by reference, expressly formed the basis of the patentable subject matter standard in United Kingdom patent law statutes until 1977.63

E. Disclosure of the Invention: Consideration for a Patent

In patent law’s infancy, the consideration required for the grant of a patent was the creation of a new industry or device and knowledge given to be public by the establishment of an industry in the realm or by training apprentices who would later be able to work the trade or industry under the patentee or independently on the expiration of the patent. Patents generally did not contain, nor were they required to contain, a description of the invention, either in writing or diagrammatic form. The reason for this would seem to be an understanding that the nature of invention was tied to a tangible trade or device rather than an abstraction capable of reduction to written or tangible form.64

While the *Statute of Monopolies* makes no demand for a disclosure of the invention in writing, a few of the early seventeenth century patents contained a specification made by the patentee, for the patentee’s benefit, to clarify the scope of the monopoly. Soon a custom of presenting a detailed description of the invention in a specification arose, complete list of patents granted between 2 March 1617 and 1 October 1852 (with a few missing patents from the 17th century) was published in the mid-1800s by Bennet Woodcroft, the first head of the English Patent Office. Newman J pointed to a number of patents on that list (aparently without having examined them) that appear to involve financial subject matter and require primarily human activity. Those her Honour identified are: No. 1197 to John Knox (July 21, 1778) (‘Plan for assurances on lives of persons from 10 to 80 years of age.’); No. 1170 to John Molesworth (Sept. 29, 1777) (‘Securing to the purchasers of shares and chances of state-lottery tickets any prize drawn in their favor.’); No. 1159 to William Nicholson (July 14, 1777) (‘Securing the property of persons purchasing shares of State-lottery tickets.’); *In re Bilski*, 545 F.3d 943, 989 (Fed. Cir. 2008) (Newman J) citing Bennet Woodcroft, *Alphabetical Index of Patentees of Inventions* 383, 410 (U.S. ed. 1969). See DF Renn, ‘John Knox’s Plan for Insuring Lives: A Patent of Invention in 1778’ (1974) 101 *Journal of the Institute of Actuaries* 285.

63 The current legislation in the United Kingdom, *Patents Act 1977* (UK), makes no reference to the *Statute of Monopolies*.
before being mandated by the courts by the middle of the eighteenth century. The need for a written specification accompanying the patent application was recognised at common law in 1778 in *Liardet v Johnson*, where Mansfield LJ directed the jury as follows.

The third point is whether the specification is such as instructs others to make it. For the condition of giving encouragement is this: that you must specify upon record your invention in such a way as shall teach an artist, when your term is out, to make it – and to make it as well as you by your directions; for then at the end of the term, the public have the benefit of it. The inventor has the benefit during the term, and the public have the benefit after.

By the end of the eighteenth century it had become settled law that the consideration for the patent was not the working of the invention per se, but the disclosure of how to make and use the invention. In *Boulton and Watt v Bull*, Buller J declared that ‘[t]he specification is the price which the patentee is to pay for the monopoly.’ Consequently, the utility requirement evolved from the question of whether the invention was capable of successful introduction in the realm to whether it could be worked in the manner and so as to achieve the results described in the specification.

**F. Uncertainty Regarding Processes During the Industrial Revolution**

When the *Statute of Monopolies* was enacted in 1624, the only subject matter thought capable of satisfying the manner of manufacture requirement were entire trades and new devices. The Industrial Revolution in the late eighteenth and nineteenth centuries

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65 *Liardet v Johnson* (1778) 1 Carp Pat Cas 35 (NP).
68 *Boulton and Watt v Bull* (1795) 1 H Bl 463; 126 ER 651, 654 (CP). See also the judgment of Lord Chief Justice Eyre, who stated at 665 that, ‘[t]he modern cases have chiefly turned upon the specifications, whether there was a fair disclosure.’ See also Attorney-General (Cth) v Adelaide Steamship Co [1913] AC 781, 793.
69 *Turner v Winter* (1787) 99 ER 127, 1276 (NP); *R v Arkwright* (1785) 1 Web Pat Cas 64, 66 (NP); *Morgan v Seaward* (1837) 1 Web Pat Cas 187, 196-197 (Ex); *Liardet v Johnson* (1778) 1 Carp Pat Cas 35 (NP); *Manton v Parker* (1814) G 297 (NP); *Hill v Thompson* (1818) 129 ER 427; *Lewis v Marling* (1829) 1 Web Pat Cas 490 (NP); verdict aff’d (1829) 1 Web Pat Cas 493 (KB).
in Britain saw the rapid development of industry brought about by the introduction of machinery, the use of steam power, the growth of factories and the mass production of manufactured goods. This brought a shift of economic emphasis from control of new industries to direct control of units of new technology,\textsuperscript{70} and more particularly, brought the patentability of processes to the fore.

One of the difficulties in identifying an historically consistent view of the objects of the patent system is the state of uncertainty that existed within English patent law until the mid-nineteenth century. The first judicial action involving the scope of patentable subject matter, \textit{Boulton and Watt v Bull},\textsuperscript{71} was not decided until 1795. The case involved a challenge to a patent held by James Watt for a new method of using an existing steam engine in a more beneficial manner than was known before by lessening its consumption of steam and fuel. As Eyre CJ said in \textit{Boulton and Watt v Bull}, ‘Patent rights are no where, that I can find, accurately described in our books.’\textsuperscript{72} In fact, the scope of patentable subject matter remained unclear for one hundred and fifty years after the \textit{Statute of Monopolies} was enacted, as judicial interpretations of various aspects of patent law were virtually absent from the common law in England until after the Privy Council relinquished all jurisdiction to hear patent suits in favour of the common law courts in 1752.\textsuperscript{73} Even though in the century and a half following the enactment of the \textit{Statute of Monopolies} the English patent registers were replete with patents claiming processes, it was not clear whether these were patentable.\textsuperscript{74} It


\textsuperscript{71} \textit{Boulton and Watt v Bull} (1795) 1 H Bl 463; 126 ER 651, 665 (CP).

\textsuperscript{72} \textit{Boulton and Watt v Bull} (1795) 1 H Bl 463; 126 ER 651, 665 (CP) (Eyre CJ). See also \textit{Wood v Zimmer} (1815) 171 ER 162 (Gibbs CJ) ('The subject of patents for new inventions has not been treated with due precision, as a branch of law by itself, in any of our law books. It is only indeed within a few years that they have become so important a part of our commercial machinery.'). The court reporter in \textit{Wood v Zimmer} said that ‘almost all of the learning and law on the subject of patents for new inventions’ may be deduced from \textit{Boulton and Watt v Bull} and \textit{Hornblower v Boulton}.

\textsuperscript{73} MacLeod, above n 5, 61. According to Mossoff, above n 5, 1262-1263 n 26, the prerogative court of Privy Council was invested with jurisdiction to hear patent disputes as early as 1562. Mossoff further records that Privy Council divested to the law courts jurisdiction over determining the validity of patents for inventions; thus putting into effect, albeit 130 years late, section 2 of the \textit{Statute of Monopolies}.

\textsuperscript{74} \textit{Boulton and Watt v Bull} (1795) 1 H Bl 463; 126 ER 651, 667 (CP) (Eyre CJ) ('Probably I do not over-rate it when I state that two-thirds, I believe I might say three-fourths, of all patents granted since the statute passed, are for methods of operating and of manufacturing, producing no new substances and employing no new machinery.').
was not until the 1842 decision of *Crane v Price*, that the patentability of methods or processes was confirmed.  

It has been said that until the early 1850s there was no distinct law of copyright, patents, designs or trade marks, nor were distinctions between these different species of intellectual property known. Further, there was not even a recognisable category of law that could be described as intellectual property. Instead, it was generally agreed that there was a fluid and uncertain category of law dealing with rights in mental labour, and it was upon mental labour that the law was understood. It was not until after 1850 that copyright, designs and patents were recognised as distinct and separate areas of law housed within a general rubric of intellectual property law, which, at that stage, did not yet include trade marks. According to the High Court of Australia in *Grain Pool of Western Australia v Commonwealth of Australia* ('*Grain Pool*') there were unresolved issues in 1900 regarding the relationships between the various intellectual property regimes. In particular, the court identified questions surrounding the differences between the protection afforded under the patent law and that with respect to registered designs. The court also noted that efforts were still being made to distinguish the conceptual bases of copyright and patent law.

G. The Emergence of Patent Law in the United States

The uncertainty surrounding the content and scope of patent law in England at that time is reflected in the drafting of the United States patent laws. Shortly after gaining independence, the United States established its own national patent regime,

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75 (1842) 1 Web PC 393; 4 Man & G 580; 134 ER 239. See also *Hill v Thompson* (1818) 129 ER 427 and *Morgan v Seaward* (1837) 150 ER 874.


77 Ibid 96-98.


80 Ibid 500-501 citing *Le May v Welch; In re Le May’s Registered Design* (1884) 28 Ch D 24; *In the Matter of Bayer’s Design* (1906) 24 RPC 65 at 74, 76-77; affirmed sub nom *Bayer v R and WH Symington (In the Matter of Bayer’s Design)* (1908) 25 RPC 56, 59-60.

independent of the early English patent tradition and the Statute of Monopolies.
Against the backdrop of the English system, the Framers of the United States Constitution explicitly limited patentability to the national purpose of advancing ‘useful arts’, rather than the English concept of ‘manufacture’.\textsuperscript{82} One of the reasons for this departure from ‘manufacture’ in favour of ‘useful arts’ was the recognition that ‘even in Great Britain that the phrase ‘new manufactures’ was an unduly limited object for a patent system, since it seemed to exclude new processes.’\textsuperscript{83}

The United States Constitution authorises the United States Congress:

To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries\textsuperscript{84}

The United States Congress passed its first patent statute in 1790 and its second in 1793. The first patent statute in 1790 ‘was largely based on and incorporated’ features of the English patent system, as did the 1793 Act.\textsuperscript{85} Both the 1790 and the 1793 Acts

\begin{footnotesize}
\textsuperscript{84} United States Constitution article I, § 8, clause 8.
\end{footnotesize}
adopted a 14-year patent term and required the inventor to file a written specification describing the invention claimed. However, in the United States the patent right has never been predicated upon importation, and has never been limited to ‘manufactures’.  

In the United States it is the language of Congress that dictates what is patentable, rather than history or the common law of England. As the framers of the United States Constitution did not solely adopt the phrase ‘manufactures’ to describe the subject matter of patents, as they might have done had they relied on the Statute of Monopolies, it is conceivable, although there is no real evidence for this, that the framers intended ‘useful arts’ to remove the uncertainty that surrounded the scope of patent protection offered in England at the time the first patent statutes were passed in the United States.

The categories of patentable subject matter found in United States patent legislation reflect a deliberate choice between competing views prevalent in England at the time of their adoption in the 1793 Patent Act. The five categories of patentable subject matter in the 1793 Patent Act, ‘manufacture,’ ‘machine,’ ‘composition of matter,’ ‘any new and useful improvement,’ and ‘art’ were either drawn from the Statute of Monopolies, and the common law refinement of its interpretation, or were intended to resolve competing views being debated in England at the time. Arguably, the inclusion of the category of ‘manufacture’ appears to reflect an intention to incorporate into United States practice as much of the common law interpretation of ‘new manufactures’ as was then understood. It would appear that the inclusion by

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(‘Much American patent law derives from English patent law.’). Before the enactment of the 1790 Patent Act, patents were granted by Congress.

86 Prager, ‘Historic Background and Foundation of American Patent Law’ above n 5, 309; Klitzke, above n 5, 638 (in Elizabethan times, novelty only required that ‘the industry had not been carried on within the realm within a reasonable period of time,’ while today ‘the proof of a single public sale of an article’ or a ‘printed publication’ can destroy novelty); Gibbons v Ogden, 22 US 1, 58-59 (1824) (Marshall CJ) (noting that patents are not awarded in the United States to someone who is not an ‘inventor’, excluding importers. This was not a patent case but it did discuss the Patents clause).


88 Lutz, above n 83, 53-54. This uncertainty stems from the fact that judicial interpretations of various aspects of patent law were virtually absent from the common law in England until after the Privy Council finally authorised patent suits to be heard in the common law courts in 1752 and the first case involving questions about the scope of patentable subject matter was not resolved until Boulton and Watt v Bull was handed down in 1795.)
Congress of any ‘art’ or ‘process’ in the patent system was a deliberate clarification of the English practice, confirming the patentability of methods.\textsuperscript{89}

**H. Emergence of the Inventive Step (Or Non-Obviousness) Requirement**

Of the contemporary requirements of patent validity, only novelty was recognised in England prior to 1623.\textsuperscript{90} Obviousness, or lack of an inventive step, was not clearly recognised as a separate ground of invalidity in Anglo-Australian law until late in the 19th century and the distinctions drawn between lack of novelty and obviousness or lack of invention and subject matter were not fully developed in the case law as it stood in 1900.\textsuperscript{91} As the High Court of Australia pointed out in *National Research Development Corporation v Commissioner of Patents*\textsuperscript{92} (‘NRDC’), although the *Statute of Monopolies* had spoken of ‘any manner of new manufactures within this realme’ and of ‘the true and first inventor and inventors of such manufactures’, it nowhere spoke of ‘the invention’.\textsuperscript{93} According to the High Court in *Grain Pool*, the term ‘inventive step’ appears first to have been used by Fletcher Moulton LJ in 1908 in the course of his Lordship’s judgment in *British United Shoe Machinery Company Ltd v A Fussell & Sons Ltd*,\textsuperscript{94} a case dealing with a challenge to the novelty of a claimed new combination of known integers, and thus cannot be traced back to the *Statute of Monopolies*. In 1894, Lord Esher MR, in *The Edison Bell Phonograph*

\textsuperscript{89} The 1793 Act explicitly included ‘any new and useful art,’ in the list of categories of patentable subject matter, a usage that was carried forward until ‘art’ was replaced with ‘process’ in 35 USC §101 and defined in §100(b) in 1952. The inclusion of any ‘art’ or ‘process’ appears to have been a deliberate clarification of a question then unresolved in English law as to whether a process or an improvement of an existing invention is patentable, a question not addressed in England until the decision in *Boulton and Watt v Bull* was brought down in 1795 and not confirmed until *Hornblower v Boulton* in 1799. That the issue to be litigated in *Boulton and Watt v Bull* was in the minds of those sitting in Congress in 1793 was likely given that the case came before the Chief Justice at sittings after Trinity term (the term beginning after Easter) in 1793. See *Boulton and Watt v Bull* (1795) 1 H Bl 463; 126 ER 651, 652. Thus, it would appear that Congress broadened the field of patent eligibility from ‘new manufactures’ to ‘useful arts’ to avoid the possible complication that the English phrase was unduly limited.

\textsuperscript{90} Although the 1474 Venetian patent statute required that an invention be ‘ingenious’, indicating a need for inventiveness, this requirement does not seem to have been imported into English patent law until much later.


\textsuperscript{93} *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252 268-269.

\textsuperscript{94} (1908) 25 RPC 631, 653.
Physical Effect in Patent Law

Corporation, Limited v Smith and Young, responded to a submission that one of the claims of the patent in suit was wanting in subject-matter by saying:

Now, whenever I hear the objection taken to a patent which has been used, which has been bought and sold, which has been therefore treated by men of business as a useful thing, that it is wanting in subject-matter, I look upon it, I confess, with an amused contempt. ...

It really comes to this, that although the invention is new - that is, that nobody has thought of it before - and although it is useful, yet, when you consider it, you come to the conclusion that it is so easy, so palpable, that everybody who thought for a moment would come to the same conclusion; or, in more homely language, hardly judicial, but rather businesslike, it comes to this, it is so easy that any fool could do it. Well, I look, as I say, upon that objection, when all others have failed, generally with amused contempt.

It was not until the enactment of the Patents and Designs Act 1907 (UK) that a distinction was drawn in statute between novelty and obviousness in the United Kingdom. It was not until 1952 that Australia and the United States followed suit. The High Court is of the view that ‘raising the threshold of inventiveness’, in this way was appropriate to balance the need of inventors for encouragement and the and the public’s need to access information.

The emergence of the independent requirement for an inventive step, first in case law, then in legislative requirements for patentability as occurred in the

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95 (1894) 11 RPC 389.
96 Ibid 398.
97 Patents Act 1952 (Cth) s 100(1)(e).
98 In The United States the concept of non-obviousness was first introduced in Patent Act 1952 (US) § 103. This provision has no statutory precursor and replaced the judge made case law requiring that an ‘invention’ be disclosed before a patent could be granted: see Giles S Rich, ‘The Principles of Patentability’ (1960) 28 George Washington Law Review 393, 398-406. The common law origins of the non-obviousness principle are said to lie in Hotchkiss v Greenwood, 52 US (11 How) 248 (where the invention related to an old method of making doorknobs whereby the doorknob had a certain shaped hole for the fastening of a shank. The only difference was that the inventor substituted a clay or porcelain knob for a metallic knob. The court described the difference as being formal and destitute of ingenuity and invention).
100 Lockwood Security Products Pty Ltd v Doric Products Pty Ltd [2004] HCA 58, [48].
United Kingdom, the United States and Australia, has always reflected the balance of policy considerations in patent law of encouraging and rewarding inventors without impeding advances and improvements by skilled, non-inventive persons. ¹⁰¹

I. Evolution of the Meaning of ‘Inventor’

As has been noted above,¹⁰² at the time of the Statute of Monopolies, the word, ‘inventor’, had a far wider meaning than it does today and included one who imported from another country.¹⁰³

In 1903, the Australian parliament decided not to follow the traditional position then enshrined in the United Kingdom legislation. It was Parliament’s view that the difficulties and dangers that faced importers no longer existed. Instead, under the Patents Act 1903 (Cth) only the ‘actual’ inventor, being the person who had used inventive ingenuity or ‘brains’, had the right to apply for a patent for invention.¹⁰⁴

The High Court in Grain Pool recognised that, unlike in the United States, there is no constitutional requirement in Australia that the actual inventor be entitled to the rewards of the patent system, but that the decision to allow patents to be granted in favour of inventors, rather than importers, is one that has been made by the

¹⁰¹ Ibid.
¹⁰² See above n 30 and accompanying text.
¹⁰³ Edgeberry v Stephens (1693) 2 Salkeld’s Reports 447; Boulton and Watt v Bull (1795) 1 H Bl 463; 126 ER 651, 665-666; Moser v Marsden (1893) 10 RPC 350, 359 (Lindley LJ) (“The Patentee is the true and first inventor within the meaning of the Patent Law, whether he invents himself, or whether he simply imports a foreign invention.”); Plimpton v Malcolmson (1876) 3 Ch D 531 (Sir George Jessel MR); Grain Pool of Western Australia v Commonwealth of Australia (2000) 202 CLR 479, 506.
¹⁰⁴ Conor Medsystems, Inc v The University of British Columbia (No 2) [2006] FCA 32, [9] (Finkelstein J) citing Commonwealth, Parliamentary Debates, Senate, 15 July 1903, 2081-2082 (Senator Drake) and Commonwealth of Australia, Parliamentary Debates, House of Representatives, 29 September 1903, 5508-5509 (Mr Higgins) (explaining that the use of the expression ‘actual inventor’ meant the ‘person who has discovered a thing’ rather than the ‘true and first inventor’ which ‘has always been held to include those who import articles from abroad’). This followed the position taken in the earlier Victorian colonial statute, the Patents Act 1889 (Vic), provided that the only person who could apply for a patent was the ‘actual inventor’ or his assigns or legal representatives (if deceased) or a person to whom the invention had been communicated by the ‘actual inventor’ or his representatives or assigns: s 7(3). ‘True and first inventor’ was defined in s 3 to mean ‘the actual inventor of any invention’ or his assigns or legal representatives, ‘but shall not include a person importing an invention from any other colony or country without the authority of the actual inventor’. The current position under the Patents Act 1990 (Cth) is that a patent for an invention may only be granted to a person who is the inventor. The term, ‘inventor’ is not defined in the Act.
Commonwealth Parliament in legislation.\textsuperscript{105} The court in \textit{Grain Pool} also recognised that in the United States, the requirement that only the ‘actual’ inventor has the right to apply for a patent in respect of an invention is constitutionally entrenched.\textsuperscript{106} The United States constitutional requirement is that the invention be the product of the mind of the applicant and not of another.\textsuperscript{107}

\textbf{J. The Internationalisation of Intellectual Property Law}

In today’s global economy, innovation crosses national boundaries. While patents are a matter of domestic law, have no extra-territorial effect and are only enforceable in a national court, there are a number of international agreements that set minimum standards with which national laws must comply.

During the 19th century, numerous multilateral international treaties dealing with intellectual property matters were entered into by nation states. The first of these were the \textit{Paris Convention for the Protection of Industrial Property} of 1883 (‘Paris Convention’), which deals with patents, designs and trade marks, and the \textit{Berne Convention for the Protection of Literary and Artistic Works} of 1887, which deals with copyright. Other multilateral international treaties dealing with intellectual property include the \textit{Patent Co-operation Treaty} of 1970 (‘PCT’), the \textit{Convention on the Grant of European Patents} (‘European Patent Convention’ or ‘EPC’),\textsuperscript{108} the \textit{Agreement on Trade-Related Aspects of Intellectual Property Rights}\textsuperscript{109} (‘TRIPS Agreement’) of 1994 and the \textit{Patent Law Treaty} (2000). This internationalisation has led to a global harmonisation of intellectual property rights and enforcement rights.

\textsuperscript{106} Ibid 506 citing \textit{Livingston v Van Ingen} (1812) 9 Johns Rep 507, 583.
\textsuperscript{107} Ibid.
\textsuperscript{108} \textit{Convention on the Grant of European Patents}, opened for signature 5 October 1973, 13 ILM 268 (entered into force 7 October 1977) (‘EPC’). See \textit{Patents Act 1977} (UK) c 37. The United Kingdom became part of the European Economic Community in 1973 and subsequently decided to adopt the EPC.
\textsuperscript{109} \textit{Marrakesh Agreement Establishing the World Trade Organization}, opened for signature 15 April 1994, 1867 UNTS 3, annex 1C (\textit{Agreement on Trade-Related Aspects of Intellectual Property Rights}) (entered into force 1 January 1995). Art. XVI.4 of the \textit{World Trade Agreement} stipulates that ‘[e]ach Member shall ensure the conformity of its laws, regulations and administrative procedures with its obligations as provided in the annexed Agreements’ of which the TRIPS Agreement is one. In January 1995, the \textit{World Trade Agreement 1995} (‘WTA’) came in operation and the World Trade Organisation (‘WTO’) was formed. The TRIPS Agreement is one of a number of associated agreements of the WTA.
The TRIPS Agreement, negotiated as part of the Uruguay Round of the General Agreement on Tariffs and Trade (‘GATT’), is the most far-reaching international intellectual property agreement yet formed. It prescribes a raft of minimum standards for patent protection in member states.

Article 27.1 of the TRIPS Agreement requires that all member states of the World Trade Organization (‘WTO’) ensure that:

patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.

Article 27.2 and 27.3 allow member states to exclude a range of inventions from patentability.

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110 Article 7 of the TRIPS Agreement sets out the agreement’s objectives. It provides that the protection and enforcement of intellectual property rights should help promote technological innovation and the transfer and dissemination of technology, to the mutual advantage of producers and users and in a manner conducive to social and economic welfare. The TRIPS Agreement is a broad intellectual property agreement that contains provisions which concern both copyright (Berne Convention) and industrial property (Paris Convention). Daniel Gervais, in his authoritative work on the drafting history of the TRIPS Agreement, described it as one of the ‘most significant milestones in the development of intellectual property in the twentieth century,’ giving ‘new life’ to the Berne and Paris Conventions of the nineteenth century. This breath of life, he explained, came in the form of the enforcement of intellectual property rights, which ‘for the first time’ enables WTO members to seek economic redress against each other for violations of minimum standards: Daniel Gervais, The TRIPS Agreement: Drafting History and Analysis (2nd ed, 2003), 3.

111 The provision goes on to say: ‘Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.’ A footnote to the text of Article 27.1 states that for the purposes of this Article, the terms ‘inventive step’ and ‘capable of industrial application’ may be deemed by a member state to be synonymous with the terms ‘non-obvious’ and ‘useful’ respectively.

112 Art 27.2 and 27.3 of the TRIPS Agreement provides:

2. Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect ordre public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law.

3. Members may also exclude from patentability:

(a) diagnostic, therapeutic and surgical methods for the treatment of humans or animals;

(b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement.
The TRIPS Agreement requires that member states recognise the fundamental nature of the patent bargain, that exclusive rights to exploit an invention are granted only in exchange for full public disclosure by the patentee of the invention and how it works. Member states are of course free to determine the appropriate method of implementing the minimum standards provisions within their own domestic legal systems. Although, as a result of countries’ domestic laws being brought into line with international treaties and courts’ willingness to be persuaded by the arguments of courts in foreign jurisdictions (particularly those in the United States), patent law is largely uniform, but not identical, across the globe.

Lately, the trend in international law has been the adoption of bilateral free trade agreements that create obligations on nation states.

There is no mention of a physicality requirement in any of the international treaties and no positive express obligation upon member states who are signatories to those treaties to implement a physicality requirement as part of domestic law.

Arguably, since the TRIPS Agreement in Article 27.1 demands that ‘patents shall be available for any inventions, whether products or processes, in all fields of technology’, it does not permit the exclusion of non-physical inventions from the scope of patentable subject matter. As such, any attempt by a domestic court within a member state to do so will arguably place that member state in breach of its obligations under that provision.

K. 1977: The Statute of Monopolies Abandoned in the United Kingdom

The final point to note in this coverage of the history of patent law is that in 1977 the United Kingdom abandoned its Statute of Monopolies-based regime for a new patent system based on the EPC.

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113 Under Art 29.1 member states are to require patent applicants to disclose the invention in a manner that is sufficiently clear and complete for the invention to be carried out by a person skilled in the art and may require the applicant to indicate the best mode for carrying out the invention known to the inventor at the filing date.

114 See for example the Australia – United States Free Trade Agreement, 18 May 2004 (entered into force 1 January 2005).

115 Patents Act 1977 (UK).
There are two main differences between the ‘manner of manufacture’ test and the patentable subject matter test under the EPC. The first is that Article 52(1) of the EPC expressly requires that a patent be granted only for an invention that is capable of ‘industrial application’. This is clearly an additional requirement to that which can be found in the Statute of Monopolies. The second is that Article 52(2) and 52(3) contains an exclusory list of what are regarded as non-inventions that are not susceptible to patentability. As has been explained above, these developments in European law are not examined in detail because have not been replicated in Australia or United States legislation and represent a significantly different patent-eligibility standard.

L. From the History of Patent Law to the Theories That Underpin Its Existence

In addition to exploring the history of patent law, there is also value in exploring the theories that underpin patent law’s existence to determine whether they disclose a theoretical basis that supports a physicality requirement.

III THEORIES OF PATENT LAW

There are a number of competing theories that have been put forward to justify the existence of intellectual property law generally and patent law in particular. These various theories are in no way conclusive of the need for a patent system, but instead attempt to explain the rationale behind the decisions to implement and maintain one. In what was arguably the leading economic review of the value of the patent system in its time, Fritz Machlup in 1958 concluded that:

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116 It has been noted that what would have been considered a ‘manner of manufacture’ under the previous law will not necessarily have ‘capacity for industrial application’: Merrill Lynch Inc’s Application [1988] RPC 1.

117 Article 52 of the EPC was implemented in United Kingdom law in s 1 of the Patents Act 1977 (UK). Although Patents Act 1977 (UK) s 1(2) uses different wording to that used in the EPC, there is no suggestion that it has any different meaning. Accordingly, the approach taken is to work directly from the source, Article 52 itself. There are several advantages to doing so, which were spelt out by Lord Justice Jacob, who gave judgment for the court in Aerotel Ltd v Telco Holdings Ltd; Re Macrossan’s Application [2006] EwCA Civ 1371, [6].
if we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it.\textsuperscript{118}

While our understanding of the relationship between patenting and economic benefit has developed since that time, we are still uncertain as to whether the patent system provides an overall net benefit.\textsuperscript{119}

\textit{A The Four Theories Traditionally Used to Justify the Patent System}

There are four theories that have been traditionally been put forward to justify the existence of the patent system. Machlup has described these as the ‘natural law’ thesis, the ‘reward-by-monopoly’ thesis, the ‘monopoly-profit-incentive’ thesis and the ‘exchange for secrets’ thesis.\textsuperscript{120}

The ‘natural law’ thesis assumes that inventors have a natural property right in their ideas and that appropriation or unauthorised use of these ideas is akin to stealing. According to the ‘natural law’ thesis, intellectual property rights are natural rights earned by adding labour to the common resource of information, with the proviso that

\textsuperscript{118} Fritz Machlup, \textit{An Economic Review of the Patent System} (1958) US Senate, Committee on the Judiciary, 2d Sess, 21, 80. Machlup said previously at 79: ‘No conclusive empirical evidence is available to decide this conflict of theories. That the automobile industry developed partly despite patents (when it still had to overcome the barrier of the basic Selden patent) and partly independently of patents (since it refrained from enforcing the exclusive rights obtained) is some presumptive evidence against the theory of the need for patent protection. That in Switzerland and the Netherlands industrial development proceeded rapidly when these countries had no patent laws is not conclusive because, one might say, they shared the fruits of the patent systems elsewhere and profited from the free imitation of technologies developed abroad—an instance of sharing the benefits without sharing the cost.’

\textsuperscript{119} William M Landes and Richard A Posner, \textit{The Economic Structure of Intellectual Property Law} (2003) 310 (‘Although there are powerful economic reasons in favour of creating property rights in inventions, there are also considerable social costs and whether the benefits exceed the costs is impossible to answer with confidence on the basis of present knowledge.’).

\textsuperscript{120} Ibid 21. See also Machlup and Penrose, above n 19, 10-11. Other theories exist: see William Fisher, ‘Theories of Intellectual Property’ in Stephen R Munzer (ed), \textit{New Essays in the Legal and Political Theory of Property} (2001) 169-173 (discussing economic and incentive based theory; Lockean/labor desert theory; personhood theory; the theory that intellectual property is an emanation of the person and the law should facilitate this personal aspect; and social planning theory, the theory that intellectual property law should be designed to culturally enrich democratic society); Justin Hughes, ‘The Philosophy of Intellectual Property’ (1988) 77 \textit{Georgetown Law Journal} 287, 288-289.
enough and as good is left for others. It posits that society has a moral obligation to recognise and protect this natural right as a form of property. This is based upon the seventeenth and eighteenth century concepts of natural rights found in the writings of John Locke, who would attribute to every person a natural right to the fruits of his or her own labour (Locke’s labour theory of property). 121

The ‘reward-by-monopoly’ thesis assumes that justice requires that an inventor be rewarded for the services he or she has provided society with by bringing to it a new invention, and the most appropriate way to secure rewards commensurate with the usefulness of the invention disclosed is by means of a monopoly of limited duration to trade in the invention.

The ‘monopoly-profit-incentive’ thesis provides that an incentive is needed to encourage people to innovate and commercialise new products. It operates on the premise that innovation will not take place in sufficient quantities if inventors and capitalists can only hope for the sort of profits that trading in a competitive market would bring. That incentive provided is the protection from free-riders that monopoly rights afford.

The ‘exchange of secrets’ thesis assumes a bargain between the inventor and society, in which the inventor discloses the workings of an invention that would otherwise be kept secret in exchange for a temporary monopoly in the invention. Key to this thesis is the temporary nature of the monopoly which allows for the invention to fall into the public domain at the expiry of the patent.

121 Support for the ‘natural rights’ theory can be found in the origins of French patent law which drew upon Locke’s work. See John Locke, Second Treatise of Government in Two Treatises of Government (3rd ed, 1689). The preamble to the French patent law of 1791 stated: ‘that every novel idea whose realisation or development can become useful to society belongs primarily to him who conceived it, and that it would be a violation of the rights of man in their very essence if an industrial invention were not regarded as the property of its creator’ (reproduced in Machlup, above n 61, 22). It must be noted that even Locke himself devoted considerable energies to analyse utilitarian rather than nonutilitarian desert-based justifications for property. For example see Richard A Epstein, ‘The Utilitarian Foundations of Natural Law’ (1989) 12 Harvard Journal of Law & Public Policy 713, 733-734. See also Universal Declaration of Human Rights, G.A. Res. 217 A (III), U.N. GAOR 3d Sess., pt. 1, article 27(2), U.N. Doc. A/RES/217 A (III) (1948) (‘everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.’). See also Hughes, above n 120, 324-325; Kevin Gray, ‘Property in Thin Air’ (1991) 50(2) Cambridge Law Journal 252, 280-281.
B  The Incentive Theory of Patent Law

It is traditionally recognised that the purpose of patent law is to further the public interest by giving an incentive to encourage people to invent new products and processes and disclose the new knowledge created to the public. It is the potential economic rewards to be reaped during the patent term that induces the time, effort, expenditure and other resources needed for innovation to occur. Thus, the object of patent law is not to recognise natural rights that might automatically accrue, but to provide an economic incentive to encourage inventors. The incentive theory of patent law is an ex ante justification for the existence of intellectual property rights: its goal is to influence behaviour that occurs before the right is brought into being.

Today, it is recognised that patent law does not solely relate to providing incentives to invent, but also relates to providing incentives to invest in innovation and the commercialisation of new inventions, the latter potentially being more costly. The incentive is given because innovation is thought to be critical to a society’s economic prosperity and standard of living.

So much is recognised in the TRIPS Agreement. Article 7 provides a clear statement of the agreement’s objectives.

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122 Machlup, above n 61, 29-30; Machlup and Penrose, above n 19, 12; Schaafsma, above n 1, 243.
The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.

That this has been the object of patent law since the earliest patent grants were made by the English Crown has been made clear by Sir Edward Coke. 125

A judicial application of the incentive theory and confirmation that it traces back at least to the Statute of Monopolies can be found in the House of Lords decision of American Cyanamid Company (Dann’s) Patent (Dann’s Patent). 126 This case involved a patent for a method of producing a new antibiotic from a naturally occurring strain of a known microorganism, and the antibiotic produced. Lord Diplock highlighted the technical aptitude, labour and expense involved in ‘searching for and finding hitherto unidentified strains of microorganisms existing in the natural state from which useful new antibiotics can be prepared by what is now a well-known standard process’, and the importance of the result produced, which was ‘a new product useful to humanity which does not exist in nature’. 127

If such research is to be encouraged in a competitive society, the monetary rewards of success must be assured to those who undertake the expense; and the means of doing so in this and in most other countries with comparable social systems is by according to the successful discoverer of the new product the controlled and limited monopoly granted for inventions under the national patent laws. …

The only definition of “invention” contained in the Patents Act 1949, is with reference to the phrase “any manner of new manufacture” in the Statute of Monopolies 1623. This Statute has never been construed as confining the

125 Coke, Institutes of the Laws of England, above n 29, 184 (‘The reason wherefore such a privilege is good in law is because the inventor bringeth to and for the common wealth a new manufacture by his invention, costs and charges, and therefore it is reason, that he should have a privilege for his reward (and the encouragement of others in the like) for a convenient time.’).
127 Ibid 451 (Lord Diplock).
grant of patents to processes that would have been within the contemplation of parliament in the early seventeenth century as constituting a new manner of manufacture. The concept of “invention” as an activity which entitles the person who undertakes it to a patent monopoly of a process or its product has been continually changing by applying the social policy which underlay the Statute of Monopolies in the seventeenth century to the changing conditions resulting from advances in technology and the sciences. That policy was to provide a material inducement to persons to undertake whatever effort and expense might be needed to introduce into the United Kingdom some useful new process or new product with a view to its becoming generally available for use or manufacture by the inhabitants of the realm. The material inducement provided was the right for a limited period to prevent other persons from using the new process or product in the United Kingdom without the consent of the inventor; but the object of the policy would not be achieved unless at the end of that period those persons wishing to engage in the business of operating processes or making products of that kind were provided with all the information necessary to enable them to operate the process or to make the product.

The counterpart of the temporary monopoly was the provision of the information.\textsuperscript{128}

It is accepted that this is the rationale for intellectual property protection in Australia.\textsuperscript{129} Kirby J, in \textit{Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd},\textsuperscript{130} endorsed what the Industrial Property Advisory Committee in its 1984 report on patents and innovation in Australia expressed as being the general objective to be attained through the operation of patent law.

\textsuperscript{128} Ibid 451-452.

\textsuperscript{129} \textit{CCOM v Jiejing} (1994) 122 ALR 417, 433; \textit{Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd} (1998) 194 CLR 171, 195 (Kirby J); \textit{Welcome Real-Time v Catuity Inc} [2001] FCA 445, [129] (Heerey J) (‘the law has to strike a balance between, on the one hand, the encouragement of true innovation by the grant of monopoly and, on the other, freedom of competition.’); Ronald Sackville, ‘Monopoly Versus Freedom of Ideas: The Expansion of Intellectual Property’ (2005) 16 \textit{Australian Intellectual Property Journal} 65, 65-66. This is the case despite the \textit{Patents Act} containing no statement as to its purpose. In this regard, Australia is not alone in failing to include any clear statement of objectives in its patent statute.

\textsuperscript{130} (1998) 194 CLR 171.
Patents are intended to stimulate innovation by offering the possibility of greater profits than could have been obtained if open competition existed. But the benefits gained from innovation fostered by the existence of the patent system must be balanced against the costs to society caused by the restrictions which patents place upon the use of the inventions to which they relate. For while the purpose of the patent system is to provide an incentive to innovation, patents also create entry barriers which prevent or retard the diffusion of innovation by imitation; that is to say, a patent confers a degree of monopoly power which has inherent anti-competitive effects. It has both social benefits and social costs.\textsuperscript{131}

The legislative policy behind the enactment of the \textit{Patents Act 1990} (Cth) was set forth by the then Minister for Science and Technology, Hon Simon Crean. Mr Crean said that the ‘essence of the patent system is to encourage entrepreneurs to develop and commercialise new technology’.\textsuperscript{132}

It is accepted that this is also the rationale for patent protection in the United States.\textsuperscript{133} So much is evident from the \textit{United States Constitution}, which authorises

\begin{itemize}
\item \textsuperscript{131} Ibid [43] (Kirby J) quoting Industrial Property Advisory Committee, ‘Patents, Innovation and Competition in Australia’ (1984), 12.
\item \textsuperscript{132} Commonwealth of Australia, \textit{Parliamentary Debates}, House of Representatives, 10 October 1990, 2565 (Simon Crean, Minister for Science and Technology) (second reading speech). Statements to the same effect were also made by others: Commonwealth of Australia, \textit{Parliamentary Debates}, Senate, 29 May 1990, 1271 (Robert Ray); Commonwealth of Australia, \textit{Parliamentary Debates}, House of Representatives, 16 October 1990, 2946 (Geoffrey Prosser), 2950 (Brian William Courtice). In addition to the incentives it provides, other reasons why the Australian Government maintains a patent system include the following. There is a need for Australia to meet its obligations at international law. While international patent law has become a tool to standardise patent law across the globe in accordance with American and European patent policy, Australia removing itself from the various international treaties that require it to maintain a patent system is not viable as this would amount to a failure to maintain good diplomatic relations with foreign nations. Further, it would risk Australians losing access to the technology of foreign patent owners, who would not release their products into our market. Failing copying by imitators in Australia or importation, those products would not be available to Australian consumers. It is worthy of note that the majority of patents granted in Australia each year are granted to foreigners, mostly United States nationals: IP Australia, \textit{IP Australia} (2009) <http://www.ipaustralia.gov.au/about/statistics.shtml> at 8 March 2009. Maintaining a patent system gives incentives to foreign firms to invest in infrastructure and introduce new technologies and products to Australia.
\item \textsuperscript{133} \textit{Quanta Computer, Inc. v LG Electronics, Inc.}, 128 S Ct 2109, 2116 (2008) (‘the primary purpose of our patent laws is not the creation of private fortunes for the owners of patents but is to promote the progress of science and the useful arts’) quoting \textit{Motion Picture Patents Co. v Universal Film Mfg. Co.}, 243 US 502, 518 (1917) quoting United States Constitution, Art I § 8 cl 8 (internal quotation marks omitted); \textit{Mazer v Stein}, 347 US 201, 219 (1954) (‘The economic philosophy behind the clause
the United States Congress to ‘To Promote the Progress of Science and useful Arts’. 134

Possibly the best enunciation of the purpose of patent law comes from the United States Supreme Court case of Aronson v Quick Point Pencil Co., 135 which explicitly draws the connection between the objectives of encouraging invention, disclosure of the invention to the public, and to ensure that ideas in the public domain remain there for the free use of the public.

First, patent law seeks to foster and reward invention; second, it promotes disclosure of inventions to stimulate further innovation and to permit the public to practice the invention once the patent expires; third, the stringent requirements for patent protection seek to assure that ideas in the public domain remain there for the free use of the public. 136

The incentives provided by the patent system are needed to encourage innovation because information and ideas are non-rivalrous resources. Non-rivalrous resources are those which are not depleted through use. An apple is a rivalrous resource. It diminishes when eaten, so that one person’s use will affect the ability of others to equally use and enjoy. Unlike physical objects, information and ideas can be freely copied and used by anyone who knows and understands them without depleting them or depriving others of their use. Creating useful ideas takes time, effort, expenditure and other resources. While the costs of producing information that describes an

empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare.’); Graham v John Deere Co., 383 US 1, 9 (1966) (‘The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge. The grant of an exclusive right to an invention was the creation of society -- at odds with the inherent free nature of disclosed ideas -- and was not to be freely given. Only inventions and discoveries which furthered human knowledge, and were new and useful, justified the special inducement of a limited private monopoly.’); Kewanee Oil Co v Bicron Corp, 416 US 470, 480-481 (1974); Bonito Boats, Inc v Thunder Craft Boats, Inc, 489 US 141, 150-151 (1989) (‘The federal patent system thus embodies a carefully crafted bargain for encouraging the creation and disclosure of new, useful, and nonobvious advances in technology and design in return for the exclusive right to practice the invention for a period of years.’); Lemley, ‘Ex Ante Versus Ex Post Justifications for Intellectual Property’, above n 123, 130 citing the extract from Mazer v Stein, 347 US 201, 219 (1954); Mark A Lemley, ‘Property, Intellectual Property, and Free Riding’ (2005) 83 Texas Law Review 1031, 1031.

134 United States Constitution article I, § 8, clause.
136 Ibid 262.
invention may be high, once conceived, that information is capable of being copied at negligible cost without re-incurring the initial costs of its conception. Patent protection allows the patentee to charge an uncompetitive price in an absence of competition to appropriate a larger share of the social benefits of an invention. This enables the inventor to recover the costs of conceiving of the invention and bringing a product to market, and to realise a reasonable profit that would not otherwise be achieved in a competitive market. In the absence of a patent monopoly, free riders who imitate and reverse engineer can lawfully earn profits by selling competing products without having to recoup the sunken costs of creating an invention. In doing so, they profit from the inventor’s ingenuity and diminish his or her market share in the process. Without patent protection, there would in many cases be little incentive under competitive market conditions to take the time, effort and expense to invent new products and processes. As a result, too few new ideas would be created and new inventions would be under produced or not produced at all, which is a public goods problem that the patent system is designed to alleviate.

The temporary nature of the monopoly means that free riding is only prevented for a limited time. Free riding itself is not inherently detrimental. Imitation is in fact the basis of much technological development. The benefits to society of allowing free riding necessitate limiting patent protection only to a level adequate to encourage innovation in sufficient quantities. Too much reward will produce a deadweight loss that will harm the public interest and unjustifiably enrich intellectual property owners. Too little reward will result in innovation occurring in insufficient quantities. Nordhaus, in a search for the optimal duration of patent rights, was of the view that each increase in the duration or strength of patents stimulates an increase in inventive activity, but only up to a point. He thought that patent duration or strength should only be increased up to the point where an additional extension would generate more social costs than benefits.

137 For an explanation of the cost and value of inventions, to inventors and the public, and the advantages an inventor has over free riders, both with and without patent protection, see Machlup, above n 61, 58-62.
Patent law involves a balance between the public interest and the interest of inventors. Of these, the primary concern is the public interest. The consideration for a monopoly grant is that the inventor must disclose the invention to be public in sufficient detail and with sufficient clarity to enable a person skilled in the art to work the invention. The patent system thus makes public inventions that would have remained secret in the absence of the incentive offered. This disclosure comes at a cost of secrecy to the patentee. The public benefits from this disclosure in two ways. Firstly, it is given access to a description of the invention being disclosed, which is a boost for follow-on inventors, who can use the information disclosed as the basis for further research and innovation. Secondly, the public gets free access to use the invention at the expiry of the patent term, when the patent falls into the public domain and becomes free for all to use without restriction.

An appropriate balance must be struck between the desire to provide incentives to pioneer inventors to innovate and the need to allow follow-on inventors to build upon existing patented inventions. As Merges and Nelson inform us, ‘every potential inventor is also a potential infringer’ and a strengthening of intellectual property narrow scope of protection so as to permit competition in improvements and speed up technological advancement: Robert P Merges and Richard R Nelson, ‘On the Complex Economics of Patent Scope’ (1990) 90 Columbia Law Review 839, 876.


rights will not always increase incentives to invent. A perfect situation would be that an inventor should receive the costs of producing the invention plus whatever is the minimum amount necessary to induce incurring those costs. Inventors who are paid less, will likely cease inventing. If they are paid more, then society is unnecessarily restricting access to the invention by consumers, free riders and other innovators.

Innovation is cumulative and evolutionary in nature. It is seldom revolutionary and never truly original. Innovation breeds more innovation that builds upon earlier technologies. As Sir Isaac Newton reportedly said, ‘If I have seen far, it is by standing on the shoulders of giants.’

An unfortunate by-product of the monopoly protection offered by patent law is that, given the cumulative nature of technological advancement, patent rights awarded to encourage innovation can have an unwanted effect of actually obstructing it. Indeed, the patent system is skewed towards stimulating invention and attracting venture capital into pioneering investment at the expense of follow-on inventors, who would make second-generation products that improve or build upon the work of pioneers in the field. The reason for this is that protection for first generation products can dilute the incentive to develop second generation products because the inventors of those second generation products must transfer some of the revenue they generate to the first innovator under a licence. However, this second limit is a necessary fact of the
patent bargain. Patent law should be structured so as to fairly balance the needs of initial inventor and improvers. If it were not for the pioneering inventor, the follow-on inventor would not be placed in the enviable position of having an established inventive base to work upon and would need to invent from scratch.\textsuperscript{148}

Try to imagine building something as complex as a car, without using any ideas from anyone who came before you (including such things as the wheel, nuts and bolts, screws, glass, and the combustion engine).\textsuperscript{149}

Allowing too generous incentives to follow-on inventors will thereby come at the expense of incentives to first innovators. Pioneering inventors will be less inclined to invent if their inventions might be superseded by new technologies which do not involve a transfer of some of the latter innovation’s revenue to the first innovator by licensing. However, there can be difficulties in the first and follow-on innovators negotiating rights to use initial inventions.\textsuperscript{150}

Many commentators have called for patent scope to be interpreted narrowly, to facilitate incentives for follow-on inventors.\textsuperscript{151} The argument in favour of narrow patent protection is pro-competition. It favours narrower patents over pioneering breakthroughs, with varying degrees based on the particular form of technology or the industry in question. Those in favour of broad patent rights endorse giving strong initial rights and leaving the parties to determine an efficient outcome between themselves, a position that greatly favours the initial mover in terms of bargaining power and economic return.\textsuperscript{152} Narrow intellectual property protection is sought to

\begin{footnotesize}
\textit{Virginia Law Review} 305, 321; Michael A Heller and Rebecca S Eisenberg, ‘Can Patents Deter Innovation? The Anticommons in Biomedical Research’ (1998) 280 Science 698, 700.\textsuperscript{148} Scotchmer, above n 142, 29-34; Lemley, ‘The Economics of Improvement in Intellectual Property Law’, above n 146, 997; Merges and Nelson, ‘On the Complex Economics of Patent Scope’, above n 139. See also Alvin Edward Moore, ‘Edison and the Phonograph’ (1932) 14 Journal of the Patent Office Society 39, 39.\textsuperscript{150} Ibid 997-998; Heller and Eisenberg, above n 147; Maureen A O’Rourke, ‘Toward a Doctrine of Fair Use in Patent Law’ (2000) 100(5) Columbia Law Review 1177.\textsuperscript{151} Merges and Nelson, ‘On the Complex Economics of Patent Scope’, above n 139; Grady and Alexander, above n 147, 321.\textsuperscript{152} This assumes that allowing one party to control all subsequent use of the patented technology should result in efficient licensing, that information is perfect, all parties are rational and that licensing is without cost.
\end{footnotesize}
enable follow-on inventors greater scope to innovate without infringement or the need to license the technology of pioneers.\textsuperscript{153}

\section*{C New Ideas Justifying the Patent System}

Other modern post-classical theories justifying the existence of the patent system abound. A prominent example is Ed Kitch’s ‘prospect theory’, which analogises patent monopolies with the management of mining claims.\textsuperscript{154} According to Kitch, the incentive theory provides an incomplete view of the patent system. He describes the process of technological innovation as one in which resources are brought to bear upon a range of prospects, each with its own probabilities of costs and returns. By ‘prospect’ he means ‘a particular opportunity to develop a known technological possibility.’\textsuperscript{155}

Kitch works on the assumption that the patent owner will be in the ideal position to maximise social benefit by exercising private rights to efficiently ‘coordinate the search for technological and market enhancement of the patent’s value’.\textsuperscript{156} His view is that, just as privatising land will encourage the owner to make efficient use of it, the patent system will do the same for inventions. Kitch’s justification for broad patent protection for the patentee, in terms of scope and duration, is that the pioneering inventor is best placed to create follow-on, or second generation products in the field, rather than newcomers. Therefore, the pioneering inventor is given a patent of broad scope that is in effect a right to prospect over the field of the invention. In Kitch’s view, a new invention would more likely be commercialised by an inventor who has broad patent protection from competitive rivalry during the early stages of commercial development of a new technology. For Kitch, this gives two advantages. Firstly, the efficient management of a prospect allows ‘breathing room’ for the inventor to invest in further development without the prospect of another firm

\textsuperscript{153} Heller and Eisenberg, above n 147. There are a number of reasons why society cannot rely upon pioneers to effectively licence their inventions so that second-generation innovators may make improvements to them. For a discussion of market failures in licensing see: Lemley, ‘The Economics of Improvement in Intellectual Property Law’, above n 146, 1047-1072; Merges and Nelson, ‘On the Complex Economics of Patent Scope’, above n 139, 864-866.


\textsuperscript{155} Ibid 265-267.

\textsuperscript{156} Ibid 271-276.
stealing his or her work.\(^\text{157}\) Secondly, allowing the inventor to coordinate the search for improvements to the initial invention reduces inefficient duplication of inventive effort among competitors and information is shared between searchers through patent law’s disclosure requirements.\(^\text{158}\)

Kitch’s theory rests upon his impressions of how the American patent system ‘has operated in fact’.\(^\text{159}\) He does not rest his theory upon the objects or ideals of the patent system that are enshrined in legislation and case law. Instead, he argues that the importance of the prospect function is based on three features of the patent system: firstly, that the broad scope accorded to patent claims goes beyond what the reward function would require (meaning that some claims extend beyond what the claimant has actually invented); secondly, that the rules of the system allow for an inventor to apply for a patent at a very early stage to secure priority, whether or not something of value has been invented; and thirdly, that technologically important patents have been awarded before commercial exploitation of the invention has been possible.\(^\text{160}\)

There are problems with Kitch’s ‘prospect’ theory. Firstly, it cannot be assumed, as he does, that the initial inventor is best placed to prospect the field of his or her invention. Merges and Nelson dispute the presumption of those in favour of ex post justifications that rivalry in innovation is a waste of resources.\(^\text{161}\)

Our general conclusion is that multiple and competitive sources of invention are socially preferable to a structure where there is only one or a few sources. Public policy, including patent law, ought to encourage inventive rivalry, and not hinder it. As the “race to invent” structures show, a rivalrous structure surely has its inefficiencies. But such a structure does tend to generate rapid

\(^{157}\) Ibid 276-277.  
\(^{158}\) Ibid 279. In this respect, granting the prospect right in advance of the invention is said to forestall competitors’ wasteful races to invent. See Grady and Alexander, above n 147.  
\(^{159}\) Ibid 267.  
\(^{160}\) Ibid.  
\(^{161}\) Merges and Nelson, ‘On the Complex Economics of Patent Scope’, above n 139, 878-878 (‘we are much better off with considerable rivalry in invention that with too little.’). Merges and Nelson offer empirical evidence in support of their contentions at 881-908.
technological progress and seems a better social bet than a regime where only one or a few organizations control the development of a given technology.\textsuperscript{162}

Secondly, Kitch’s focus on what he perceives to have been the award of overly broad claims extending beyond what the claimant has actually invented to cover any abstraction of an invention is misplaced. He does not give adequate weight to the initial breakthroughs of a first innovator.\textsuperscript{163} Instead, what might be perceived as broad patent claims may be necessary to adequately reflect the benefits of a new breakthrough brought into being and adequately protect against free-riding, thereby ensuring there is a reward to encourage potential first innovators. They have nothing to do with managing a right to prospect over further developments in the field. The same can be said for Kitch’s claims that there is a need for unification of control over a prospect, thereby removing the problem of ‘different parts of what can be most efficiently exploited as one prospect’ lying in different hands.\textsuperscript{164} Each of those ‘different parts’ represents a reward given to an inventor for an advancement of technology that might not have been uncovered but for the incentives given by the patent system.

Thirdly, the fact that technologically important patents have been awarded before commercial exploitation has been possible is irrelevant. Commercial exploitation is not a prerequisite to patentability.

Kitch was supported by Grady and Alexander who see one goal of granting a right to prospect in advance of an invention as being to prevent the wasteful duplication that occurs when competitors race to invent. However, while the ‘winner takes all’ nature of patenting arguably leads to wasted effort on the part of the firm or firms that do not win the race, this model of competitive innovation is thought to be the most efficient.\textsuperscript{165} By setting up a winner-takes-all race where the first to file obtains a

\textsuperscript{162} Ibid 908. Merges and Nelson reviewed the evidence of technological development in several selected industries to test the theory that granting broad protection to the pioneer patentee in a cumulative technology industry accelerates technology.


\textsuperscript{165} Machlup, above n 61, 50; Merges and Nelson, ‘On the Complex Economics of Patent Scope’, above n 139, 878.
monopoly, the patent incentive induces what Grady and Alexander term ‘wasteful’ duplication, which leads to ‘rent dissipation’. By focussing on the rent-seeking behaviour that patent monopolies induce, Grady and Alexander, attempt to make conclusions about what is an ideal patent scope.\textsuperscript{166} However, according to Merges, the costs to society of patent races have been substantially overstated and the costs of duplication of effort must be weighed against the likelihood that we get better results through competition than we would granting one person the right to invent in a particular field.\textsuperscript{167}

Kitch’s theory is an ex post justification for the existence of intellectual property, which focuses on what happens to an inventive idea after the award of a patent monopoly, rather than on the ex ante incentive to create new ideas given before the award of a monopoly. His theory defends the award of monopoly rights, not on the basis of the incentive to invent, but on the incentive they give to manage and control property rights in ideas that have already been created.\textsuperscript{168}

Ex post justifications are often relied upon to push for an unlimited or otherwise lengthy term of protection beyond the current patent duration. Accepting their validity is inconsistent with the expiration of intellectual property protection and ideas falling into the public domain, or notions of fair use and the legitimate creation of derivative works. These arguments nominate the intellectual property owner as the entity most efficiently able to use an idea, at the expense of allowing an idea to be used according to market forces.\textsuperscript{169} They have since morphed into a belief that intellectual property protection of anything that is of value is needed and that an intellectual property owner has an entitlement to capture all possible value from protected information.\textsuperscript{170}

\textsuperscript{166} Grady and Alexander, above n 147.
\textsuperscript{168} Lemley, ‘Ex Ante Versus Ex Post Justifications for Intellectual Property’, above n 123, 130.
\textsuperscript{169} Ibid 131.
\textsuperscript{170} Felix Cohen has dispelled this myth: Felix Cohen, ‘Transcendental Nonsense and the Functional Approach’ (1935) \textit{Columbia Law Review} 809, 815 cited and reproduced in Lemley, ‘Ex Ante Versus Ex Post Justifications for Intellectual Property’, above n 123, 131 n 7 (‘The vicious circle inherent in this reasoning is plain. It purports to base legal protection upon economic value, when, as a matter of actual fact, the economic value of a sales device depends on the extent to which it will be legally protected.’). Ex post justifications were given to support the \textit{Sonny Bono Copyright Term Extension Act}, which added a further 20 years to the already lengthy copyright term in the United States: 17 USC
Ex post justifications stem from broader arguments in favour of privatising finite resources to avoid a ‘tragedy of the commons.’ Garret Hardin famously wrote in 1968 that the Earth’s resources should not be owned collectively by mankind because common ownership would result in overuse. He found that individuals making private use of common property seek to maximise their own self interest without regard to the degradation that results from that use, because each individually only bears a small portion of the costs of that degradation. This overuse explains why common pastures are overgrazed and common fishing areas are depleted. Hardin’s theory is that private ownership of property solves the tragedy of the commons because the owner internalises the costs and benefits of use. Thus, if individuals own only a small portion of the pasture or the lake and can exclude others from that area, then they will act to ensure that the pasture or the lake will not be depleted of resources so that it can continue to be used and hold its economic value. If property rights in a particular resource, such as land, are privately owned, transactions will occur that allow each resource to be put to its most efficient use.\footnote{Garrett Hardin, ‘The Tragedy of the Commons’ (1968) 162 Science 1243, 1244-1245. See also Richard Posner, \textit{Economic Analysis of Law} (2nd ed, 1977) 27-31 (who argued that all resources should be owned by someone, except resources so plentiful that everyone can consume as much of them as they want without reducing consumption by anyone else (the universality principle)).}

The ex post justifications attempt to apply Hardin’s ‘tragedy of the commons’ to informational resources and intellectual property. The argument is that ideas and information ought to be privately owned so that they are not depleted through overuse. This line of reasoning is employed to push for private rights in ideas and information of unlimited duration.\footnote{William M Landes and Richard A Posner, ‘Indefinitely Renewable Copyright’ (2003) 70 \textit{University of Chicago Law Review} 471, 475.}

Ex post justifications for the existence of intellectual property laws have been refuted by Mark Lemley, who has described them as ‘anti-market’.\footnote{Lemley, ‘Ex Ante Versus Ex Post Justifications for Intellectual Property’, above n 123, 139-141} They defend the award of monopoly rights, not on the basis of the incentive they provide to create new ideas, § 302 (and to the copyright term in Australia by virtue of the \textit{Australia United States Free Trade Agreement}) on the ground that extended intellectual property rights were needed to give existing copyright owners, some of whom had died, an incentive to preserve films already made and distribute books already published. The rationale was that there would be no incentive to preserve these films and distribute these books without attendant property rights.
but on the incentives they give to acquire and control property rights in ideas already in existence. He has dispelled the notion that a single entity is better positioned to make efficient use of an idea; rather it is competition in the race to improve ideas that leads to faster improvements in technology. Further, he argued that if a single entity is better positioned to make efficient use of an idea, there is no basis for that entity being the owner of the intellectual property rights in question: such an allocation is arbitrary.174

Secondly, Lemley says that the idea of a tragedy of the information commons is fundamentally flawed because it misrepresents the nature of information. Information can never be depleted because its consumption is non-rivalrous. He holds that arguments in favour of preventing overgrazing of ideas are unfounded because intellectual property rights exist to give incentives to create and disseminate new ideas, not suppress their use. It regards ideas as public goods over which privatisation for a limited time is an anomaly that exists only to encourage others to invent and create. The fallacy of ex post arguments in favour of intellectual property rights is that there is no tragedy of the commons in ideas and information because ideas and information are not like physical property that can be worn out through overuse. Ideas and information simply cannot be ‘used up’ or depleted; indeed, copying and disseminating ideas and information makes them more prevalent.175

Ex post justifications for the existence of the patent system are not really justifications at all. They are the means by those with established interests in the intellectual property market lobby governments seeking an expansion of existing intellectual property rights. These arguments are concerned only with maintaining the status quo of market position and extending the benefits of previous innovation. This is a group that is afraid of competition and the need to continue to innovate. They seek to stifle competition from imitators and derivative works for an unreasonable duration. These arguments are contrary to the object of patent law to encourage innovation. In fact, offering unlimited or unnecessarily extended periods of

174 Ibid.
intellectual property protection hearkens back to the practice of the English Crown granting of odious monopolies on existing products.

Jamie Boyle has theorised that we are in the middle of a ‘second enclosure movement’ wherein more and more elements that were previously in the public domain of the intellectual commons are being privatised in the same way that land was privatised starting in the fifteenth century.176 Boyle argued that strong intellectual property rights are not necessarily the best means of encouraging innovation and creativity or promoting justice.177 Those seeking to rely on ex post justifications to increase the scope of patent protection, or the duration of patent protection, are complicit in the second enclosure of the public domain.178

It is curious that modern ex post justifications for the existence of the patent system have arisen at all given that the patent system has not changed significantly since its beginnings in the Republic of Venice. The Venetian statute of 1474 reveals all the fundamental features of today’s patent system,179 and we can see the basic features of our modern patent system in the English patent practice of the early seventeenth century.180 In the absence of evidence of significant changes to the operation of the patent system or the legislative intent behind patent law statutes since their foundation in the Republic of Venice, it is difficult to see how the incentive theory of patent law could be displaced in favour of newly discovered justifications for the existence of the patent system.

D Patents as a Species of Property

177 Ibid 63.
178 See Peter Drahos and John Braithwaite, Information Feudalism: Who Owns the Knowledge Economy? (2002) (the authors draw a parallel between medieval feudalism and what they see as ‘information feudalism’).
Modern conceptions of intellectual property view it as a species of property. Specifically, it is a form of intangible personal property: a chose in action. In many jurisdictions this is enshrined in law.

The primary allocative function of property rights is to internalise externalities. In economics, externalities (or spillovers) are a side effect or consequence of an industrial or commercial activity that affects other parties in ways that are not reflected in the cost of the goods or services involved. An example is the pollination of surrounding crops by bees kept for honey. Property rights develop in a field when the gains to be had from internalising externalities become larger than the costs of internalisation, and arise in response to changes in technology or relative prices.

The major advantages of intellectual property are that proprietary rights allow content providers to control rights over intellectual resources and internalise the value of their creations, subject to positive externalities. This is made possible by the exclusive nature of private property rights (the right to exclude others from the right to exercise rights that lie within the bundle of recognised intellectual property rights).

Secondly, property rights are also easily transferable as they are bundles of rights that have clearly identifiable boundaries and scope. Objects of private property can be freely traded, so they can move from less efficient to more efficient uses. The decreased costs of defining the boundaries of intellectual goods that propertisation provides reduces transaction costs.

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181 The concept of property does not refer to a ‘thing’, but a description of a legal relationship between humans in respect of ’things.’ For the concept of property as a bundle of rights and the rights that are commonly comprised in the bundle, see *Milirrpum v Nabalco* (1971) 17 FLR 141, 171 (Blackburn J); Gray, above n 121.

182 For example, in Australia see *Patents Act 1990* (Cth) s 13, and in the United States see 35 USC § 261.


184 It is not possible to internalise all externalities. For example, the full benefits of the transistor or the telephone did not accrue to those who conceived and brought those innovations to market.


Lemley warns against drawing comparisons between real and intellectual property that would import into intellectual property the rhetoric of property rights as the right to capture or internalise the full social value of property. To do so would deny the importance of the balance that patent law seeks to find between public and private rights in ideas. It must always be remembered that this balance is designed to reward creators in order to encourage further innovation and that only incentives sufficient to encourage innovation to take place in sufficient quantities are justifiable. Any attempt to internalise all externalities of new inventions goes beyond the patent law bargain.

Patent law currently maintains an appropriate distinction between information and ideas that can be made the subject of personal property, and those which cannot. Only information and ideas that describe or are the basis of an invention are capable of being privatised. Inventions that are capable of being privatised are identified by determining whether they fall within the scope of patentable subject matter or the excluded categories of subject matter, and by applying the strictures of novelty, inventiveness and utility.

It is not necessary, nor is it appropriate, to exclude purely non-physical inventions from the scope of patentable subject matter to protect information and ideas from the clutches of privatisation. If there are compelling arguments, backed by empirical evidence, that demand that certain classes of invention not be capable of being privatised, then it is the responsibility of the legislature to step in and address those arguments. The role of the courts in this regard is to apply the patentability standards currently enshrined in law, not to act as a law maker.

IV INCENTIVE THEORY AND INFORMATION ECONOMICS IN THE INFORMATION AGE

This Part considers the degree to which the history of patent law and practice and the incentive theory of patent law continues to be of relevance today in the knowledge age.

economy of the Information Age. It draws a link between the incentive theory of patent law and innovation theory and information economics.

It is suggested that current thinking in innovation theory supports the view that patent law’s function as an incentive to promote technological innovation is not well served by a physicality requirement. It is argued that since the patent system is designed to promote innovation, and innovation is just the generation of new ideas and information, it makes little sense to limit the scope of patentable subject matter only to new technologies that are limited by physical constraints.

A Innovation Theory in the Information Age

Innovation, the creation and application of new ideas, is a key factor in achieving economic growth and prosperity. Innovation is considered essential to a country’s economic growth and competitiveness and is a key factor that contributes to prosperity and standards of living. Prosperity, or success in material terms, is achieved through maximising innovative output and the creation of new technologies. Economists have long known that innovation is a far greater determinant of how a country’s productivity and output grows than increases in capital investment or improvements in workers’ skills. The public benefits of innovation are increased efficiency, technological progress, improved standards of living, a more comfortable and simplified life, and enhanced personal security. These benefits can be achieved by a nation, an individual, a firm, or an industry gaining a competitive advantage over its peers.

It is thought that the sum of material human achievement to date is due to our ability as a species to innovate. Innovation provides us with the tools we need to free ourselves from many of the time-consuming tasks necessary for survival, allowing us to devote time to higher pursuits. Rather than hunting for food, we can more quickly and easily buy it from a shop, and devote more time to study, learn and create new technologies that further enhance our lives.

Innovation is a cumulative process that builds upon and improves existing technologies. In a competitive economy, a new invention typically makes obsolete a previous one and activates a process of substitution, whereby new firms or new products and processes supersede existing ones, a process Joseph Schumpeter called ‘creative destruction’. According to Schumpeter, firms compete to innovate. New firms destroy existing firms and new products replace existing products, leading to dynamic transformation of economic systems. Competition between rivals searching for a solution to a problem is a race to invent. That race will often be a race to the patent office, rather than to market an unprotected invention that would be susceptible to imitation by free riders who would not need to incur the same research and development costs of the original inventor. In all countries other than the United States, a race to invent is won by the first person to file a patent application, who is awarded a patent. In the United States the first to invent has prior claim to the invention. Schumpeter concluded that a certain amount of monopoly power in the marketplace, including patent protection, was required so that society might take the benefits of technological innovation. He argued that temporary protection from competition would encourage firms to invest in innovation so that the benefits of the invention might be adequately appropriated and therefore provide an adequate incentive to invest in invention.¹⁹²

Arrow recognised that innovation is more than just the creation of new and improved products and processes. He recognised that innovation is instead the production of

¹⁹² Schumpeter, above n 140, 81-108.
new information, knowledge and ideas.\textsuperscript{193} For Arrow, innovation is as simple as creating value or doing something more efficiently by performing an action in a new way. It can be as simple as a reduction in the cost of producing a good, or even the cost of doing business generally.\textsuperscript{194}

Innovation is about creating new technology. Technology is an important kind of information. It is the application of information or knowledge to do new things and it is the process of creating better and more useful information.\textsuperscript{195} Information is regarded as a resource like any other. Thus, we regard information as an ordinary material good that is both an input and a product of the innovative process,\textsuperscript{196} making it both the raw materials and products of the Information Age. According to Mandeville:

\begin{quote}
Information is inherently intangible, yet our concepts of technology – both in conventional economics and in the popular mind – wrap it very much in the tangible. In other words, we tend to regard technology as if it were an ordinary material good.\textsuperscript{197}
\end{quote}

That the history of patent law reveals a tradition in which patents have been granted in respect of physical subject matter is unsurprising given that innovation in bygone eras has predominantly been marked by technological advances in the production of machines, physical devices, and physically transformative processes.\textsuperscript{198} Throughout the eighteenth century ploughs, sextants, and smelting were at the cutting edge of technology. At the forefront of the state of the art were the tools of agriculture that drove primarily agrarian economies before the advent of the Industrial Revolution. Likewise, the Industrial Revolution in Britain is characterised by developments in the

\textsuperscript{194} Scotchmer, above n 142, 31.
\textsuperscript{196} Arrow, ‘Economic Welfare and the Allocation of Resources to Invention’, above n 193; Arrow, \textit{The Economics of Information}, above n 193. See also Mandeville, above n 195, 357-359.
\textsuperscript{197} Mandeville, above n 195.
manufacture of textiles, mining, metallurgy and transport. During the Industrial Revolution, the state of the art consisted of machinery and industrial manufacturing processes whose essential elements involved iron, steel, springs, gears, steam and water power. As R Carl Moy observed:

The Supreme Court handed down [Cochrane v Deener, 94 US 780 (1876)] during the Industrial Revolution. At that time, valuable business activities tended to involve primarily manufacturing. The use of physical transformation as [a] trigger to patentability was thus a reasonably good fit; by their very nature manufacturing processes involve transforming raw materials.199

In the nineteenth century, the dominant technological advances of that time were devices that harnessed the motive power of electricity.200 The nineteenth century saw astounding progress in transport, construction, and communications technologies. For example, the steam engine, which had existed since the early eighteenth century, was used for both steamboat and railway transport. Telegraphy also developed during the nineteenth century,201 as did chemical, electrical, petroleum, and steel technologies.

In the twentieth century, technology evolved at a pace not known before in human history. Radio, radar, early sound recording, and our ability to use electricity were the key technologies that paved the way for the telephone, fax machine, and television. Rapidly developing military communications and electronics technologies paved the way for the development of the computer and communications technologies such as the mobile phone and Internet. Automobiles, airplanes, air conditioning and refrigeration all became affordable and came into common use. The twentieth century also saw a focus on the teaching of scientific method and government spending on technological research and development broadly adopted in many countries. In addition, the twentieth century marked the point at which the economies of the most technologically advanced nation-states moved away from purely being manufacturing bases to become knowledge-based economies. By that stage, the bleeding edge of

199 Moy, above n 39, 1086.
201 These included the transmission of electrical signals over a distance (Morse’s telegraph, Patent No. 1,647 and Bell’s telephone, Patent No. 174,465) and incandescence (Edison’s light bulb, Patent No. 223,898).
technology had become biotechnology, semiconductors, computer hardware, software, electronics, telecommunications and Internet technologies.

Looking forward, futurists say that the next big areas in future innovation will be nanotechnology, genetics, biotechnology, health sciences (especially in the fields of medical diagnosis, personalised medicine and neurotechnology), information technology and communications (including computer software, and computer and telecommunications networks), environmental protection and renewable energy production. The innovators among us today are building the foundations of these new technologies and industries.

As such, the patent system should encourage innovative and useful products and processes beyond those that exist in traditional scientific and engineering fields. The travelling salesman problem is a helpful example of the sort of knowledge- and information-based innovation that is likely to be of prominence in the Information Age. The problem is one of combinatorial optimisation. The aim is to identify the shortest possible route that enables a salesman to visit each of a list of cities only once, given the distance between each pair of cities. Engineers have developed practical and useful applications of the travelling salesman problem to optimise delivery and service routing, microchip manufacturing, and genome sequencing, to name a few.

At the beginning of the Information Age, we find that the creation of knowledge and information has surpassed in importance the mass production of manufactured goods. While the bulk of new technology today still involves the manufacture of

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202 John Maddox, What Remains to Be Discovered: Mapping the Secrets of the Universe, the Origins of Life, and the Future of the Human Race (1998) 375-376 (‘Technology in the coming decades will be dominated by genetic manipulation. Those who can perform it will feed the hungry and cure the sick. The task of understanding the functions of the 10 000 human genes will require ten times the effort involved in their identification.’). For predictions as to the breakthroughs we will see in nanotechnology, biotechnology, neurotechnology and information technology by 2020 see James Canton, The Extreme Future (2006) 75-78. See also Richard Watson, Future Files: A History of the Next 50 Years (2007).


new machines and processes that transform physical matter, since the late twentieth century we have seen the economic focus in first world economies shift from the provision of manufactured articles to the provision of intangible goods and services. Consequently, knowledge has become by far the most important factor determining standards of living, more important than land, capital or labour, and the only truly sustainable source of competitive advantage. Today, some two-thirds of the value of large American businesses can be traced to intangible assets that embody ideas. This is manifested in the number of patent applications filed worldwide.

An information economics perspective sees innovation as a non-precise, non-linear phenomenon in which market feedbacks are of importance. Information economics focuses on knowledge as a key input to production, and sees innovation as a complex chain of multiple feedback loops between a range of players and interdependencies: ‘a collective, social, learning, evolutionary process’. It recognises that innovation concerns any kind of novelty: artistic, scientific, technological, organisational, cultural, social or individual, and that information comes from many sources as well as research and development. Innovation and technological change create winners and losers as well as dominant and dominated positions.

at the heart of many of the most important changes now underway in our individual, social, business, and governmental activities’).


In 1984, the book value of America’s top 150 public companies (what their physical assets would bring on the open market) was about 75 percent of their stock market value. American businesses were worth roughly what their land, equipment and buildings could be sold for. In 2005, the book value of America’s 150 largest public firms equalled 36 percent of their stock market capitalisation: Shapiro and Pham, above n 191, 3 citing H.R. Rep. No. 109-673 (2006) and Lowell L Bryan and Michele Zanini, ‘Strategy in an Era of Global Giants’ (2005) (Issue 4) McKinsey Quarterly 46; Shapiro and Varian, above n 191, 3.


Ibid.
Information economics distinguishes between highly codified and highly uncodified technology. Codification represents learning that has been made tangible, codified into machines, blueprints, technical and trade journals and patent specifications, that can be communicated without a human intermediary. A patent specification represents a degree of technology codification, a working machine produced in a laboratory represents a further degree. Highly uncodified information is pure, intangible information. It includes undeveloped ideas as well as the know-how required to make a technology work. It is best communicated via personal communication between people. Both codified and uncodified information are complementary. Patents codify knowledge and ideas and thereby reduce their dissipation. Increasing the rate of patenting increases the rate of growth of the stock of available knowledge in patent databases.211

B The Relationship Between Innovation, Intellectual Property and the Incentive Theory of Patent Law

Economists consider innovation and scientific discoveries to be the drivers of economic progress. Innovation is considered essential to a country’s economic growth and competitiveness in overseas markets, its economic prosperity and its people’s standards of living.212 In 1957, Nobel Prize winner Robert Solow demonstrated that most of the economic growth in the United States in the first half of the 20th century could be explained by investment in research, development and

211 Ibid 362.
212 Machlup, above n 61, 76 (‘The claim that the patent system serves to disseminate technological information, and that this accelerates the growth of productivity in the economy, is not questioned.’); United States Federal Trade Commission, ‘To Promote Innovation: The Proper Balance of Competition and Patent Law’ (2003) 1 (‘[I]nnovation benefits consumers through the development of new and improved goods, services and processes. An economy’s capacity for invention and innovation helps drive its economic growth and the degree to which standards of living increase.’). Adam Smith in part attributed the ‘wealth of nations’ to beneficial exchanges of innovation and knowledge between specialised, efficient producers. He considered that ‘man educated at the expense of much labour and time…may be compared to one of those expensive machines,’ emphasising the importance of knowledge and ideas embodied in individuals. Adam Smith, The Wealth of Nations, Book I (1776). Modern economists discovered that significant growth in a nation’s wealth could not be associated with an equivalent growth in the inputs of tangible capital, labour, and natural resources, as an economist like Smith would expect. Instead, some unexplained element, when added to the wealth generated from classic tangible inputs, accounted for a country’s actual productivity. Economists now generally accept that the missing element is knowledge and innovation, which has been described as the ‘new wealth of nations.’
education, rather than increases in capital and labour.²¹³ Romer followed on from Professor Solow’s work, demonstrating that investment in knowledge as a capital good increases long-run, national economic growth.²¹⁴ His theory is that in the long run, the accumulation of knowledge is boundless and may account for increasing per capita output in gross domestic product that cannot be explained by tangible increasing inputs such as capital, labour, and natural resources.²¹⁵

There is said to be a causal link between intellectual property and economic growth. It is said that intellectual property is a driver of innovation that causes economic growth.²¹⁶ As Arrow observed, patents and other intellectual property rights have facilitated the emergence of markets in ideas and information.²¹⁷ Economic theory predicts that without this government-induced intervention in the market, society will not produce technological innovation in sufficient quantities, which is a suboptimal outcome.²¹⁸

Intellectual property is big business, and the importance of patents has grown as more and more patent applications are filed on average each year than ever before.²¹⁹

Intellectual property is becoming increasingly important relative to old property

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²¹⁵ Ibid 1008-1013.
²¹⁷ Arrow, ‘Economic Welfare and the Allocation of Resources to Invention’, above n 193. A recent study of global intellectual property protections concluded that inadequate patent protection ‘greatly discouraged’ innovation and found that eight of the top ten most innovative countries were also among the top ten in strength of patent protection: Edwin Lai, ‘Intellectual Property Protection in a Globalizing Era: Insights from the Federal Reserve Bank of Dallas’ (2008) 3(3) Economic Letter 1, 4-5.
paradigms,\textsuperscript{220} as we witness the rise in importance in first world economies of ideas, knowledge and intellectual ‘products’.\textsuperscript{221} However, to remain relevant, intellectual property law must keep pace as society changes. As new technological knowledge makes new types of useful devices and processes possible, our understanding of what the law regards as patentable subject matter needs to keep pace. In the Information Age, the law must continue to ensure that the objects of the patent system are met, namely that the monopoly rewards on offer serve as incentives to spur innovation.

The key principle of a knowledge economy is that knowledge has characteristics of a public good. Once discovered and made public, it can be freely reproduced and distributed at minimal cost. All knowledge and ideas build on the work of others, but are also open to free-riding once disclosed. Government has a role in the knowledge economy to create policies that encourage the kind of creativity and risk taking that the scientific entrepreneurship requires. The public policy considerations centre around education, creating financial incentives to innovate, and creating the institutions that facilitate ideas being brought into fruition. Success in the knowledge economy requires creativity, higher order cognitive skills in addition to basic skills. Education policy requires a focus on developing within a population higher cognitive skills and training in science and technology. Countries that find ways of fostering this kind of knowledge base and skills within its population in the long run will have a competitive advantage over those that do not. A regulatory and taxation policy must be structured to avoid penalising and give incentives to those who engage in research and development activities. In devising regulatory policy, there is an important balance to be struck between public and private interests in intellectual property’s protection of intellectual assets. Enforcing intellectual property rights stimulates innovation and the creation of new knowledge and ideas, but strengthening intellectual property rights also raises the price of a key input in the production of future new knowledge and ideas.\textsuperscript{222} In terms of patent protection, what is needed is an appropriate patentable subject matter test that properly balances these complementary, but competing, interests.

\textsuperscript{220} Hughes, above n 120, 288.
\textsuperscript{221} Mandeville, above n 196, 357.
Technological advances bring challenges to the law of intellectual property. New technological developments create ever increasing quantities of potential subject matter capable of being protected by intellectual property rights. What is notable is that, despite these rapid technological advances and our changing conceptions as to the nature of technology and innovation, the rules of patent law remain largely unchanged from when they were devised at a time when inventions were purely chemical or mechanical substances or objects. What is needed is an innovation policy and a patentable subject matter test that can appropriately accommodate new and unforeseen advances in technology, which recognises that technology is not solely based in traditionally recognised physical products and transformative processes.

V Conclusion

This chapter ties innovation theory and information economics to the incentive theory of patent law to demonstrate that introducing a physicality requirement is not consistent with promoting innovation in the Information Age. It suggests that current thinking in innovation theory supports the view that patent law’s function as an incentive to promote technological innovation is not well served by a physicality requirement. The nature of innovation in the knowledge economy of the Information Age and its relationship with the incentives to innovate and invest in innovation that patent law provides is such that it makes little sense to limit the scope of patentable subject matter to new technologies that involve physical constraints. Since innovation is nothing more than the creation of new knowledge and ideas and is not contingent on the creation of new machines, physical devices and transformative methods, it will not be promoted by limiting the scope of patentable subject matter to those traditional manufacturing and physicality-based industrial technologies.

While the focus of the patent system has historically been on the production and alteration of physical artifacts, neither the history of patent law nor the incentive theory indicate that the patent system is in fact limited in this way. Instead, the history and theories of patent law support a broad interpretation of the scope of patentable subject matter, free of artificial fetters such as the physicality requirement currently finding favour in the courts. They reveal a 500-year-old innovation policy
dating back to the Venetian Republic designed to promote economic prosperity, employment, and knowledge transfer, and to enrich and simplify our lives. Imposing a physicality requirement is in no way consistent with and does nothing to advance these aims.

Our observations of the history of the patent system are that from its earliest days, the commercial and technical innovation it has encouraged has been about bringing new technology to bear. From its inception, the early patent custom in Venice and England revealed a patent system which promoted importation as well as invention. In the Venetian patent statute of 1474 we see all the elements of modern patentability we know today. In the early patent custom in England we see novelty and the need for an invention to be of practical utility. The history of patent law displays the discipline’s progression from one bearing mercantilist aims, in which incentives were granted to the ‘first and true inventor’, to one to promote actual invention and investment in innovation, in which incentives are granted to the ‘actual inventor’. This change brought a shift of economic emphasis from the control of new industries to the direct control of units of new technology.223

While the Statute of Monopolies may have outlawed ‘odious monopolies,’ it said nothing of what types of subject matter would qualify for a patent or what sort of restrictions on patentable subject matter exist. None of the more recent developments, such as the emergence of separate bodies of patent law in Australia and the United States, or the emergence of a body of international law dealing with patent law, have created a physicality requirement. Therefore, it must be said that the history of patent law does not reveal a requirement that an invention must produce a physical effect or cause a physical transformation of matter to be eligible for patent protection.224

What the history of the patent system tells us is that patent law is a tool of economic development which exists to promote the progress of useful arts. As has been explained, the useful arts have been understood as being the domain of the industrial

manufacturer, artisan, engineer and draftsman, but are more recently recognised as referring to all technological innovation that is of practical utility, regardless of the field of endeavour in which it exists. Thus, there is a distinction between useful arts, which are the practical works of artisans and their modern technological, industrial and commercial equivalents, and the fine arts, namely the literary, artistic and creative works of writers, artists, sculptors and the like. The former are patent eligible subject matter, but the latter are not. This is a concept that dates back to Venetian patent statue of 1474 and grants made under the exercise of the Royal prerogative by Elizabeth I and James I in the sixteenth and seventeenth centuries, as well as having been adopted by the drafters of the *United States Constitution*.

It can be seen that while there has been evolution in the various standards of patentability, one factor that has largely remained unchanged through the evolution of patent law is the scope of patentable subject matter. The evolution of standards for determining patentability, at least in Australia and the United States, are to be found not in patentable subject matter, but in the other requirements for patentability. For example, the need for a sufficient written description of the invention and claims defining the scope of the monopoly claimed were not formally recognised until 1778 in *Liardet v Johnson*.225 Likewise, the standard of novelty has evolved from one recognising the efforts of the ‘first and true inventor’ to bring a new technology to the realm to one in which recognition is given to the ‘actual inventor’ of technology not previously described anywhere in the world. Again, the standard of inventiveness has evolved from one measured against the common general knowledge within the jurisdiction to one measured against the common general knowledge of information located anywhere in the world. In light of the fact that most research is more often than not done in teams rather than by individuals working alone, the law recognises that the ‘person skilled in the relevant art’ for the purposes of assessing inventiveness will be a team rather than an individual researcher.226

The incentive theory acts as an ex ante justification for the existence of intellectual property rights in that its goal is to encourage innovative activity before patent rights are brought into being. It does not involve any ex post considerations as to how patent

225 *Liardet v Johnson* (1778) 1 Carp Pat Cas 35 (NP).
The incentive theory holds that patent law exists to encourage innovation in all fields of endeavour and across all technologies. It does not provide for any limitation on the scope of innovative technologies that are encouraged, other than the requirement that the useful arts be promoted. It does not discriminate between classes of invention, nor does it discriminate between inventions in particular fields or industries. Arguably, this technology-neutral approach to patent eligibility has been adopted in the drafting of Article 27.1 of the TRIPS Agreement. Like the history of patent law, the incentive theory indicates that introducing a physicality requirement is not consistent with the goal of the patent system to provide incentives to encourage innovation in all its guises, be those physical and non-physical. Instead, patent law is about achieving an appropriate balance between the need to provide sufficient private rights as an incentive to encourage innovation, and the public’s right to use and build upon existing information and ideas. It aims to provide appropriate incentives to encourage inventors to create new and inventive products and processes by rewarding successful technological advances. It is to do so without stifling innovation or unreasonably interfering with trade and commerce.

This view of the history and incentive theory of patent law is consistent with the trends in innovation theory that have currency today. The history of the patent system has always been about creating an incentive to innovate and bring new products and processes to market and to disclose new technologies to the public. The incentive has always been limited in duration to enable others to learn and use the technology without restriction once the exclusivity period has come to an end. This is entirely consistent with the notions that innovation is the production of new information, knowledge and ideas, and that technology is little more than the application of information or knowledge to do new things and it is the process of creating better and more useful information. It is entirely consistent with the notion of information being an ordinary material good that is both an input and a product of the innovative process. Given the nature of innovation in the Information Age and the relationship it bears with the incentives to innovate and invest in innovation that patent law provides, it makes little sense to limit the scope of patentable subject matter by introducing a physicality requirement. Since innovation is nothing more than the
creation of new knowledge and ideas and is not contingent on the creation of new machines, physical devices and transformative methods, its progress will not be served well by limiting the scope of patentable subject matter to traditional manufacturing and physicality-based industrial technologies.
CHAPTER 3 - PATENTABLE SUBJECT MATTER IN THE UNITED STATES

I INTRODUCTION

There has been conjecture in the United States, as there has been Australia, as to whether new and useful non-physical inventions are, and should be, eligible for patent protection. With a view to isolating principles that may be applicable in Australia, this chapter examines the United States test for determining whether an invention is patent eligible subject matter. It finds that non-physical inventions are not excluded from the scope of patent eligibility in the United States, contrary to the finding of the United States Court of Appeals for the Federal Circuit ('Federal Circuit' or 'CAFC') in In re Bilski\(^1\) ('Bilski'). It concludes that the Federal Circuit’s machine-or-transformation test is not the dividing line that separates patent eligible subject matter and the recognised categories of excluded matter, namely fundamental principles, natural phenomena and abstract ideas.\(^2\)

This chapter is organised in the following way. Part II sets out the constitutional and legislative framework that supports the United States patent system. Part III examines the United States Supreme Court precedents in which that constitutional and legislative framework has been interpreted. Part IV examines the later Federal Circuit decisions which interpret and apply both that constitutional and legislative framework and the Supreme Court’s precedents. It considers the law leading up to and following the decisions in State Street Bank & Trust Co. v Signature Financial Group, Inc.\(^3\) ('State Street') and AT&T Corp v Excel Communications, Inc.\(^4\) ('AT&T v Excel') and includes an in-depth discussion of the recent cases of Bilski, In re Comiskey\(^5\).

\(^1\) In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc) cert. granted sub nom. Bilski v Doll, 129 S. Ct. 2735 (2009).
\(^4\) AT&T Corp v Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999).
\(^5\) In re Comiskey, 554 F.3d 967 (Fed. Cir. 2009).
(‘Comiskey’) and In re Nuijten6 (‘Nuijten’). Part V explains that it is the remaining strictures of novelty, non-obviousness and the requirement that an invention be properly described and enabled that are the focus of patentability and that it is these limitations that will exclude undeserving subject matter from patentability. Part VI notes that the Supreme Court does not favour rigid proxy tests as a substitute for undertaking detailed legal analysis. Part VII asks whether a technological contribution is required by United States law. The chapter concludes in Part VIII that United States patent law does not contain a physicality requirement and sets out what arguably is the test for determining patent eligible subject matter according to accepted doctrine.

II CONSTITUTIONAL AND LEGISLATIVE FRAMEWORK

A The ‘Intellectual Property Clause’ of the United States Constitution

The United States Congress has legislative power to make laws with respect to patents by virtue of the ‘intellectual property clause’ in the United States Constitution, which empowers the Congress:

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;7

The intellectual property clause embodies a balance between the need to encourage innovation and the avoidance of monopolies which stifle competition without any related advance in the ‘Progress of Science and useful Arts.’8 The clause not only gives Congress legislative authority, but also limits the scope of that authority such that Congress may only make laws with respect to patents for inventions that promote ‘useful arts’.9 The clause is drafted as a ‘balanced sentence’ in which a distinction is

7 United States Constitution article I, § 8, clause 8.
9 Graham v John Deere Co., 383 US 1, 5-6 (1966) (Clark J) (‘At the outset it must be remembered that the federal patent power stems from a specific constitutional provision… The clause is both a grant of power and a limitation. This qualified authority, unlike the power often exercised in the sixteenth and
drawn between ‘science’, which is the domain of the ‘writings’ of ‘authors’, and ‘useful arts’, which is the domain of the ‘discoveries’ of ‘inventors’.

While there is little historical evidence of what is meant by the term, ‘useful arts’, it appears that it was intended to refer to ‘arts’ used in industry and the production of goods, or the practical works of artisans. Arguably, the ‘useful arts’ are what were considered to be ‘useful arts’ in 1789 when the United States Constitution was adopted and encompasses the modern equivalents of those practices. It has been argued that the present day equivalent of the term ‘useful arts’ is the ‘technological arts’, meaning that the ‘useful arts’ embody technological advances. While the impetus for a United States patent system has its origins in the British patent practice and the Statute of Monopolies, the Statute of Monopolies is of no legal effect in the United States. In pursuance of this constitutional mandate, Congress quickly

seventeenth centuries by the English Crown, is limited to the promotion of advances in the “useful arts.” It was written against the backdrop of the practices -- eventually curtailed by the Statute of Monopolies -- of the Crown in granting monopolies to court favorites in goods or businesses which had long before been enjoyed by the public. The Congress in the exercise of the power patent may not overreach the restraints imposed by the stated constitutional purpose.” (citations omitted); Bonito Boats, Inc v Thunder Craft Boats, Inc, 489 US 141, 146 (1989); KSR International Co. v Teleflex Inc., 550 US 398, 427 (2007) (reaffirming that patents are designed to promote “the progress of useful arts”); In re Shao Wen Yuan, 188 F.2d 377, 380 (CCPA 1951) (“It is interesting to note that this particular grant is the only one of the several powers conferred upon the Congress which is accompanied by a specific statement of the reason for it.”); In re Comiskey, 554 F.3d 967, 976 (Fed Cir 2009).


12 In re Comiskey, 554 F.3d 967, 976-977 (Fed Cir 2009) quoting Paulik v Rizkalla, 760 F.2d 1270, 1276 (Fed. Cir. 1985) (en banc); In re Musgrave, 431 F 2d 882, 893 (CCPA 1970) (the court in Musgrave cites no authority for the proposition that the ‘technological arts’ and ‘useful arts’ are equivalent, while Musgrave itself is cited as authority for the proposition in subsequent opinions); In re Waldbaum, 457 F 2d 997, 1003 (CCPA 1972) (“The phrase ‘technological arts,’ as we have used it, is synonymous with the phrase ‘useful arts’ as it appears in Article I, Section 8 of the Constitution.”). See also John R Thomas, ‘The Patenting of the Liberal Professions’ (1999) Boston College Law Review 1139, 1140; Malla Pollack, ‘The Multiple Unconstitutionality of Business Method Patents: Common Sense, Congressional Consideration, and Constitutional History’ (2002) 28 Rutgers Computer and Technology Law Journal 61; Karl B Lutz, ‘Patents and Science: A Clarification of the Patent Clause of the U.S. Constitution’ (1948) 18 George Washington Law Review 50, 54.

13 21 Jam 1, ch 3 (1623) (Eng).

legislated with respect to patent law, enacting its first federal patent statute, the Patent Act of 1790. The current legislation is the Patent Act of 1952, which is codified in 35 USC.

The legislation requires that to be patentable, an invention must fall within one or more of the four categories of patentable subject matter enumerated in 35 USC § 101, be new, novel, non-obvious and useful. The invention claimed must also be described in sufficient detail and enabled so that one with ordinary skill in the subject matter of the patent can make and use the invention.

B Patentable Subject Matter Under 35 USC § 101

Grounded in the constitutional mandate to promote the ‘useful arts’, the patentable subject matter standard in § 101 provides that all ‘new’ and ‘useful’ processes, machines, manufactures, and compositions of matter are patent eligible.

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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15 35 USC § 101.
16 35 USC § 102. Novelty requires that no one has anticipated the invention by previously inventing, describing, or using it. It would run contrary to the objects of the intellectual property clause in the United States Constitution to allow the grant of a patent in respect of an invention that already exists within the public domain. For prior art to anticipate an invention, it must have been in existence prior to the date upon which the inventor reduced the invention to practice. The United States uses a first-to-invent system, rather than the first-to-file system that is used in all other countries in the world: 35 USC § 135.
17 35 USC § 103. The nonobviousness requirement is that an invention claimed must be not be obvious to one with ordinary skill in the subject matter of the patent. The nonobviousness requirement extends the field of unpatentable material beyond that which is known to the public under § 102, to include that which could readily be deduced from publicly available material by a person of ordinary skill in the field of endeavour: Graham v John Deere Co., 383 US 1, 15 (1966).
18 35 USC §§ 101, 112. The disclosure requirements form the basis of the patent’s claims and the scope of protection afforded by the patent.
19 35 USC § 112. Language setting forth categories of patentable subject matter has existed throughout the history of American patent law. The country’s first federal patent statute, the Patent Act of 1790 § 4, 1 Stat. 109, 111 (1790), permitted a patent on ‘any art, manufacture, engine, machine or device.’ Shortly thereafter, the Congress changed the language to allow a patent for ‘any new and useful art, machine, manufacture or composition of matter’ in the Patent Act of 1793 § 1, 1 Stat. 318, 319 (1793). The next substantial amendment to the patent laws left this statutory language unchanged in the Patent Act of 1836 § 6, 5 Stat. 117, 119 (1836). This language has largely persisted, with the exception that
The four categories of § 101 statutory subject matter are a threshold or gateway through which an alleged invention must pass before the other requirements of patentability need be assessed.\textsuperscript{21} In interpreting this provision, the Supreme Court has recognised that the scope of statutory subject matter is broad.\textsuperscript{22} In \textit{Diamond v Chakrabarty}, it said that:

\begin{quote}
In choosing such expansive terms as “manufacture” and “composition of matter,” modified by the comprehensive “any,” Congress plainly contemplated that the patent laws would be given wide scope.\textsuperscript{23}
\end{quote}

The court went on to famously say, citing the Committee Reports accompanying the 1952 Act, that patentable subject matter comprises ‘anything under the sun that is made by man.’\textsuperscript{24} However, the interpretive value of this oft-cited phrase is dubious.

The full sentence in the Committee Reports is, “A person may have ‘invented’ a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of [this] title are fulfilled.” When viewed in its entirety, it can be seen that the language refers only to manufactures and machines, and makes not mention of processes. It is therefore doubtful that the words used can be interpreted to mean that Congress intended that ‘anything under the sun’ is patentable.

While no explicit exclusions follow the broad language of § 101,\textsuperscript{25} the Supreme Court has identified general categories of excluded matter, namely discoveries of laws of

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\textsuperscript{21} \textit{Diamond v Diehr}, 450 US 175, 188 (1981). The Federal Circuit has recently been said that although § 101 is a ‘threshold inquiry’, if a patent application can be easily struck out for lack of novelty, non-obviousness or insufficient description, then it can be struck out without the need to consider § 101: \textit{In re Bilski}, 545 F.3d 943, 950 n 1 (Fed. Cir. 2008) (\textit{en banc}). This interpretation of ‘threshold’ is properly construed as being a barrier to be crossed, but not necessarily the first barrier to be crossed.


\textsuperscript{23} \textit{Diamond v Chakrabarty}, 447 US 303, 308 (1980). There the Supreme Court noted that the Act embodied Jefferson’s ‘philosophy that ingenuity should receive a liberal encouragement.’


\textsuperscript{25} Congress has declined to follow the practice adopted in some other countries that expressly exclude medical procedures, mathematical methods, computer software, plant or animal varieties, and
nature, naturally occurring phenomena and abstract ideas.\(^{26}\) These recognised categories of excluded matter are one of the means by which patent law ensures that subject matter that rightfully remains within the public domain is not privatised. They ensure that fundamental principles and abstract ideas remain ‘free for all to use’.\(^{27}\)

In addition to the requirement that an invention fall within one of the four statutory categories, § 101 provides that an invention must also be ‘new and useful’. Linn J in dissent in *In re Nuijten* explained that the word ‘new’ in § 101 is separate from, and additional to, the § 102 novelty requirement. He explained that there is precedent which supports the view that the word ‘new’ in § 101 requires that an invention be a ‘new’ creation ‘made by man,’ rather than the discovery of a principle pre-existing in nature. In other words, it must be an invention.\(^{28}\)

Thus, a discovery or invention can fail to be “new” in the § 101 sense even if it has not previously been known to man or recorded in the prior art--that is, even if it is “novel” under § 102. Certain innovations, no matter how new to human thought, are not the type of technological invention to which Congress has extended patent protection, but instead are considered to be abstract truths that were not “made by man.”\(^{29}\)

In his view, the requirement that an invention be ‘new’ is ‘at the core of the judicial doctrine by which the recognised categories of excluded matter, the laws of nature, natural phenomena, and abstract ideas, are excluded from patentable subject matter.’\(^{30}\)

\(^{26}\) *Diamond v Chakrabarty*, 447 US 303, 308-309 (1980); *Diamond v Diehr*, 450 US 175, 185 (1981) citing *Parker v Flook*, 437 US 584, 589 (1978) and *Gottschalk v Benson*, 409 US 63, 67 (1972). That these forms of subject matter are excluded from patentability is a principle that dates back more than 150 years to *Le Roy v Tatham*, 55 US 156, 175 (1852) and *O'Reilly v Morse*, 56 US 62 (1854).

\(^{27}\) *Bonito Boats, Inc. v Thunder Craft Boats, Inc.*, 489 US 141, 151 (1989).

\(^{28}\) *In re Nuijten*, 500 F.3d 1346, 1363-1364 (Fed. Cir. 2007).

\(^{29}\) Ibid 1364.

\(^{30}\) Ibid.
The utility requirement of § 101 demands that an invention be ‘practically useful’ in the sense that it must claim a specific practical useful result. Abstract ideas are not patentable because they are not useful, but a practical application of an abstract idea, which provides a useful result, may be patentable, provided it satisfies the other conditions and requirements of patentability. In Brenner v Manson, the United States Supreme Court held that:

unless and until a process is refined and developed to the point of a substantial utility—where a specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

In that sense, the Supreme Court said, it ensures a patent is ‘not a reward for the search, but compensation for its successful conclusion.’ This is arguably the sentiment Rich J intended to convey in the controversial ‘useful, concrete and tangible result’ test in State Street.

Of critical importance to determining the physicality issue is what sorts of processes or methods are patentable. Of the four categories of patentable subject matter, only ‘process’ is specifically defined in the Patent Act.

The term ‘process’ means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

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34 Ibid 536. The utility requirement excludes impractical and inoperative inventions such as perpetual motion machines. The USPTO rejected a patent application for a perpetual motion machine because the machine failed to produce perpetual motion. See Newman v Quigg, 877 F.2d 1575, 1582 (Fed. Cir. 1989). The utility requirement does not preclude patents for immoral or illegal inventions. Whether an invention is illegal in a particular jurisdiction or thought to be morally offensive or questionable by a section of the community is not relevant to the question of utility: Juicy Whip, Inc. v Orange Bang, Inc., 185 F.3d 1364, 1366-1368 (Fed. Cir. 1999).
35 State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1373 (Fed. Cir. 1998).
36 35 USC § 100(b). The Patent Act of 1793 originally used the term ‘art’ rather than ‘process’. The term ‘process’ was introduced in the 1952 Patent Act, when it replaced the word ‘art’, while the rest of § 101 remained unchanged. The Supreme Court has held that this change did not alter the scope of
The apparently circular definition of ‘process’ to mean ‘process, art or method’ makes clear that the terms, ‘process’, ‘art’ and ‘method’ are synonymous. Without any limitation, the term ‘process’, read alone, appears to be co-extensive with nearly any possible human endeavour that can be described as a series of steps. However, to be patent eligible under § 101, a process must comprise clearly defined steps that are stable, predictable, and reproducible. By not including a reference to the need for physical transformation in the definition of ‘process’ in 35 USC § 100(b), Congress has indicated that physicality is not relevant to the patent eligibility of processes.

As far as the remaining categories of patent eligible subject matter are concerned, the Supreme Court has said that a ‘machine’ is ‘a concrete thing, consisting of parts, or of certain devices and combination of devices’ and that this includes ‘every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result.’ In Diamond v Chakrabarty, the Supreme Court said that a ‘manufacture’ is ‘the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand labor or by machinery’. It also said that ‘composition of matter’ is consistent with its common usage and includes ‘all compositions of two or more substances and… all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids.’


37 Burr v Duryee, 68 US 531, 570 (1863).
38 Corning v Burden, 56 US 252, 267 (1854).
In summary, patentable subject matter comprises any ‘new and useful’ invention in the ‘useful arts’ that falls within the four categories of § 101 subject matter, but lies outside the recognised categories of excluded matter.\(^{42}\)

### C Recognised Categories of Excluded Matter

The recognised categories of excluded matter are discoveries of laws of nature, abstract ideas and natural phenomena.\(^{43}\) There is no recognised exclusion of processes that involve or wholly consist of ‘mental steps’.\(^{44}\)

Patents are not available in the United States for a mere discovery, no matter how useful, novel or nonobvious. Fundamental principles and natural phenomena can never qualify for patent protection because they are not inventions since they are not ‘new’ in the sense of having been ‘made by man’.$^{45}$ While discovery of the laws of nature is noble and may involve significant time, expense and ingenuity, this is not the sort of work the patent system seeks to encourage and reward. Instead, it is thought that discoveries of fundamental principles and the laws of nature rightly belong in the public domain.$^{46}$ As the laws of nature have always existed, waiting to

\(^{42}\) Gottschalk v Benson, 409 US 63 (1972); Parker v Flook, 437 US 584 (1978); Diamond v Chakrabarty, 447 US 303, 309 (1980); Diamond v Diehr, 450 US 175, 182, 185 (1981). It is also evident from the Federal Circuit decisions: State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998); In re Alappat, 33 F.3d 1526 (Fed Cir 1994); AT&T Corp. v Excel Communications, Inc., 172 F.3d 1352. Further, it is evident in the dissent of Newman J in In re Schrader, 22 F.3d 290 (Fed. Cir. 1994), In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc), and In re Ferguson, 558 F.3d 1359 (Fed. Cir. 2009).

\(^{43}\) Diamond v Chakrabarty, 447 US 303, 308-309 (1980); Diamond v Diehr, 450 US 175, 185 (1981) citing Parker v Flook, 437 US 584, 589 (1978) and Gottschalk v Benson, 409 US 63, 67 (1972). That these forms of subject matter are excluded from patentability is a principle that dates back more than 150 years to Le Roy v Tatham, 55 US 156, 175 (1852) and O’Reilly v Morse, 56 US 62 (1854).

\(^{44}\) Diamond v Diehr, 450 US 175, 182, 185 (1981); Diamond v Chakrabarty, 447 US 303, 309 (1980).

\(^{45}\) Funk Bros Seed Co v Kalo Inoculant Co, 333 US 127, 130 (1948) (in which claims to non-inhibiting strains of bacteria were invalidated as they were held to be manifestations of the laws of nature). In Gottschalk v Benson, 409 US 63, 67 (1972) it was said that, ‘[p]henomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.’ Breyer J, dissenting in Laboratory Corporation of America Holdings v Metabolite Laboratories., Inc., 126 S Ct 2921, 2922 (2006) recognised that the prohibition on patenting the laws of nature exists because it is recognised that ‘too much patent protection can impede rather than “promote the Progress of Science and useful Arts”’ and it prevents ‘the enormous potential for rent seeking that would be created if property rights could be obtained’ over the laws of nature and ‘the enormous transaction costs that would be imposed on uses.’ (emphasis omitted).
be discovered by humans, it is recognised that they are not the product of human ingenuity. Examples of fundamental principles include Sir Isaac Newton’s observations on the law of gravity and Albert Einstein’s general theory of relativity. It is only when a discovery or fundamental principle of nature is reduced to a specific practical application in a ‘process, machine, manufacture, or composition of matter’ under § 101 that it becomes eligible for protection. For example, Einstein’s formula, \( E=mc^2 \) is a law of nature in the abstract available to all, and cannot be protected by patent law. However, a patent may protect a practical application of the formula that produces a useful practical result.

Abstract ideas are not eligible to be patented because they are not ‘useful’ in the sense that they have not been applied to produce a specific practical result. Broadly claimed abstract methods inhibit future innovation by restraining the ability of competitors to develop alternatives to a patented invention. In so doing, they thwart a key objective of the patent system, which is to foster new alternatives to existing products and methods. Secondly, they go beyond what the inventor has actually invented and

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48 Diamond v Diehr, 450 US 175, 187-188 (1981) (emphasis in original). See also Mackay Radio & Telegraph Co v Radio Corp of America, 306 US 86, 94 (1939) (‘While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge and scientific truth may be.’). There is clear and consistent Supreme Court authority that establishes that patent eligibility requires harnessing the ‘laws of nature’ for the benefit of mankind that dates back to Dolbear v American Bell Telephone Co (The Telephone Cases), 126 US 1 (1888), a consolidated action of numerous suits brought by Alexander Bell for alleged infringement of his patent on the telephone. In that case, the Supreme Court, at 532 held that Bell’s fifth claim utilised a law of nature to produce a useful result: ‘electricity, one of the forces of nature -- is employed, but electricity, left to itself, will not do what is wanted. The art consists in controlling the force as to make it accomplish the purpose.’ The court in United States v Dubilier Condenser Corp., 289 US 178, 188 (1933), explained that ‘the act of invention… consists neither in finding out the laws of nature, nor in fruitful research as to the operation of natural laws, but in discovering how those laws may be utilized or applied for some beneficial purpose, by a process, a device or a machine.’ Fifteen year later, in Funk Bros Seed Co v Kalo Inoculant Co, 333 US 127, 130 (1948), the court held that ‘[h]e who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end,’ a statement that has been reiterated by the Supreme Court in Gottschalk v Benson, 409 US 63, 67 (1972) and Diamond v Diehr, 450 US 175, 188 n 11 (1981).
49 Diamond v Chakrabarty, 447 US 303, 309 (1980) quoting Funk Bros. Seed Co v Kalo Inoculant Co., 333 US 127, 130 (1948) (‘[A] new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that \( E=mc^2 \); nor could Newton have patented the law of gravity. Such discoveries are ‘manifestations of … nature, free to all men and reserved exclusively to none.’). The words, ‘discovers’ and ‘discoveries’, used in the Constitution and § 101 do not carry their broadest possible meaning. They are read as being synonymous with ‘invent’ and invention.
50 Le Roy v Tatham, 55 US 156, 175 (1852); Slimfold Manufacturing Co. v Kinkead Industries, Inc., 932 F.2d 1453, 1457 (Fed. Cir. 1991) (‘Designing around patents is, in fact, one of the ways in which
thereby unjustly reward him or her to the extent that the abstract claim exceeds the scope of his or her inventive contribution to the art.\textsuperscript{51}

A famous exposition of the principle that overbroad claims are not patent eligible came in \textit{O’Reilly v Morse}.\textsuperscript{52} In \textit{O’Reilly v Morse} the Supreme Court approved Samuel Morse’s claims to a method of signalling using electromagnetism to send telegraph messages. The Supreme Court approved Morse’s claim to ‘the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for telegraphic purposes’ (Morse code) ‘for a process of using electromagnetism to produce distinguishable signs for telegraphy’.\textsuperscript{53} The court rejected Morse’s claim 8, which claimed the use of ‘electro-magnetism, however developed for marking or printing intelligible characters, signs or letters at any distances’,\textsuperscript{54} because it would preempt all possible means of accomplishing the desired result, even those Morse had not conceived, and would therefore be a claim on the principle of electro-magnetism for all forms of transmitted communication.\textsuperscript{55}

In \textit{Dolbear v American Bell Telephone Co (The Telephone Cases)},\textsuperscript{56} the Supreme Court discussed the difference between the unpatentable natural phenomenon of electromagnetism and the potentially patentable application of that phenomenon in telephony. Alexander Graham Bell’s patent broadly claimed a method and apparatus for telegraphically transmitting sound using electrical vibrations. The court stated that unlike Morse, who in claim 8, claimed magnetism as a motive power without regard to process, Bell’s ‘art consisted in so controlling the force as to make it accomplish

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\item the patent system works to the advantage of the public in promoting progress in the useful arts, its constitutional purpose.’).
\item \textit{O’Reilly v Morse}, 56 US 62, 117 (1854).
\item 56 US 62 (1854).
\item \textit{O’Reilly v Morse}, 56 US 62, 86, 94-95, 111 (1854).
\item Ibid 112.
\item Ibid 112-113 (‘It is impossible to misunderstand the extent of this claim. He claims the exclusive right to every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing intelligible characters, signs, or letters at a distance.’). Ultimately, striking out Morse’s claim 8 may be less about subject matter and more about the scope of the claims compared with the underlying specification that describes the invention. Since the 1952 Act, courts consider that issue under § 112, which addresses written description and enablement. It is § 112, not §101, that is the proper vehicle for preventing overbroad claims.
\item 126 US 1 (1888).
\end{enumerate}
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the purpose’ of transmitting speech.\textsuperscript{57} It then concluded that Bell’s claim reciting a method of using electricity to transmit speech were patentable subject matter even if the method was not tied to a specific apparatus, as it was not one for all telephonic use of electricity.\textsuperscript{58}

D Novelty and Nonobviousness

The novelty and nonobviousness requirements ensure that a patented invention represents a sufficient advance over the prior art to warrant the inconvenience the public would suffer as a result of the award of a monopoly. They operate to ensure that the ideas that exist within the public domain remain there for all to use.\textsuperscript{59}

Taken together, the novelty and nonobviousness requirements express a congressional determination that the purposes behind the Patent Clause are best served by free competition and exploitation of that which is either already available to the public, or that which may be readily discerned from publicly available material.\textsuperscript{60}

In stressing the importance of the nonobviousness standard relative to the other patentability requirements, Merges has stated as follows.

The nonobviousness requirement, embodied in section 103 of the patent code, lies at the heart of our patent system and, in many ways, is the most significant obstacle that a patent applicant faces. Indeed, it has been called the “final gatekeeper of the patent system.”\textsuperscript{61}

The Supreme Court recently weighed in on the interpretation of the § 103 nonobviousness requirement. In \textit{KSR International Co. v Teleflex Inc.},\textsuperscript{62} the court criticised the Federal Circuit’s ‘rigid’ application of its ‘TSM’ (teaching, suggestion,

\textsuperscript{57} Ibid 532.
\textsuperscript{58} Ibid 537-539. See also \textit{Gottschalk v Benson}, 409 US 63, 69 (1972).
\textsuperscript{59} \textit{Aronson v Quick Point Pencil Co.}, 440 US 257, 262 (1979); \textit{Bonito Boats, Inc v Thunder Craft Boats, Inc}, 489 US 141, 150-151 (1989).
\textsuperscript{60} \textit{Bonito Boats, Inc v Thunder Craft Boats, Inc}, 489 US 141, 150 (1989).
motivation) test for evaluating nonobviousness, instead preferring a ‘flexible’ and ‘functional’ approach consistent with the court’s prior decisions.63 As the Supreme Court explained in KSR, § 103 bars patents for improvements that are the result of ‘common sense’ or ‘ordinary creativity.’64

E Description of the Invention

Section 112 provides that an applicant must give a full, clear and concise written description of the invention and the process of making and using it. It also requires that the applicant disclose the ‘best mode’ of carrying out the invention, sufficient to ‘enable’ a person of ordinary skill in the art to make and use it.

The disclosure requirement in § 112 is a quid pro quo for the patent grant.65 This is the nature of the patent bargain, a quasi-social contract between the inventor and the public, where the reward of private monopoly rights is balanced against the public’s right to access and build upon the new knowledge and technology disclosed by the inventor. In addition to defining the extent of the patentee’s rights, this disclosure serves the public interest in two ways. Firstly, through disclosure society gains knowledge of the invention. That disclosure may form the basis of further learning, research, study and subsequent innovation by others. Thus, disclosure enables others to make improvements on the patented technology during the term of the patent, by either ‘inventing around’ the patent to produce a non-infringing improvement, or by developing an infringing improvement.66 Secondly, at the end of the patent term the invention falls into the public domain. The public is then able to use the invention free of charge and without restriction, provided that it is otherwise lawful to do so. Thus, the disclosure requirement ensures that the patent applicant reveals the knowledge necessary to enable others to make and use the invention.

63 Ibid 415, 417.
64 Ibid 420-421.
66 An inventor whose invention infringes another person’s patent will not barred from patenting the improvement, but will need to obtain a licence from the patentee of the infringed patent in order to exploit the invention.
There is a harmony that connects the § 112 disclosure and enablement requirement with the § 101 distinction between abstract ideas and fundamental principles and the practical application of ideas or principles. If an applicant claims an abstract idea or fundamental principle, he or she will not have made a disclosure that is sufficient to enable a person skilled in the art to perform an invention.

III  SUPREME COURT DECISIONS INVOLVING PATENTABLE SUBJECT MATTER

The starting point in considering the case law relating to patentable subject matter in United States law is the trilogy of Supreme Court algorithm cases, *Gottschalk v Benson,* 67 *Parker v Flook* 68 and *Diamond v Diehr,* 69 and the decision in *Diamond v Chakrabarty.* 70

A  *Gottschalk v Benson*

In the first of those cases, *Gottschalk v Benson,* 71 the Supreme Court in 1972 considered the patentability of a method for converting binary-coded decimal (‘BCD’) numerals into pure binary numerals in general purpose digital computers. The method is known as the ‘Benson-Tabbot algorithm’, and is named after its inventors, Gary Benson and Arthur Tabbot.

The patent application discloses a method that involves the conversion of information from one computer-readable format to another computer-readable format. 72 The court interpreted the claims as being ‘not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use,’ 73 and characterised the claimed method as an ‘algorithm,’ which it defined as a ‘procedure for solving a given type of mathematical problem’. 74 The question the court sought to answer was whether the method claimed is a ‘process’ for the purposes of § 101.

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71 409 US 63 (1972). Douglas J delivered the opinion of the court, in which all members joined except Stewart, Blackmun and Powell JJ, who took no part in the consideration or decision of the case.
72 Ibid 64.
73 Ibid.
74 Ibid 65.
The case focussed on two different claims in the application, namely, claim 8 which claimed the method as automated and performed on a type of hardware (a reentrant shift register), and claim 13, which claimed in more general terms, a ‘data processing method’ that made no reference to hardware. Claim 13 is purely non-physical in nature. It can be carried out on existing computers or can be performed without a computer. It can be carried out by a person mentally or by using a pencil and paper by following the steps specified. The method requires no independent human judgment. It does not claim a particular physical machine or device, is not intended to run on a specific computer or other device, and does not cause a transformation of physical subject matter. Although the algorithm had been optimised to run on a computer by changing the order of steps that a human would ordinarily use, it is purely procedural in the sense that it just requires an ability to follow the instructions that describe the method.

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75 Claim 8 reads:

The method of converting signals from binary coded decimal form into binary which comprises the steps of
(1) storing the binary coded decimal signals in a reentrant shift register,
(2) shifting the signals to the right by at least three places, until there is a binary ‘1’ in the second position of said register,
(3) masking out said binary ‘1’ in said second position of said register,
(4) adding a binary ‘1’ to the first position of said register,
(5) shifting the signals to the left by two positions,
(7) shifting the signals to the right by at least three positions in preparation for a succeeding binary ‘1’ in the second position of said register. (Reproduced at Gottschalk v Benson, 409 US 63, 73-74 (1972)).

76 Claim 13 reads:

A data processing method for converting binary coded decimal number representations into binary number representations, comprising the steps of
(1) testing each binary digit position ‘1,’ beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary ‘0’ or a binary ‘1’;
(2) if a binary ‘0’ is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;
(3) if a binary ‘1’ is detected, adding a binary ‘1’ at the (i+1)th and (i+3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;
(4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and
(5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed. (Reproduced at Gottschalk v Benson, 409 US 63, 74 (1972)).

In addressing the patent’s validity, the court recognised that there are categories of subject matter that fall within the public domain and are thus not patentable. The court described these in the following way.

Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.  

The court held that the claims in question relate to an unpatentable abstract concept by virtue of the expansive scope of its potential use. In doing so, the court did not pay any regard to how new or useful the claimed invention might have been. In what can be described as confusing reasoning, the court categorised the claims as being abstract because it thought they would wholly pre-empt a fundamental principle expressed as a mathematical formula and cover both known and unknown uses of the algorithm.

Here the “process” claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion.

In regard to the physicality issue, it has been mistakenly asserted that Gottschalk v Benson sets out a requirement that for a process to be patentable, it must invoke a physical transformation. The section of the judgment that purportedly sets out this requirement quotes obiter dicta from the earlier Supreme Court decision of Cochrane v Deener.

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78 Ibid 67.
79 It might have been the case that the Benson-Tabbot algorithm would not have been patentable on the grounds of novelty and nonobviousness. However, the court did not enquire into these issues and did not seek to remand the matter to have the patent compared with the relevant prior art. 
81 Ibid 68.
82 In re Bilski, 545 F.3d 943, 953-959 (Fed. Cir. 2008); In re Comiskey, 554 F.3d 967, 978-979 (Fed. Cir. 2009).
83 Cochrane v Deener, 94 US 780 (1876).
A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing.\textsuperscript{84}

The court then went on to say that transformation is the ‘clue’ to the patentability of a process claim.

Transformation and reduction of an article “to a different state or thing” is the clue to the patentability of a process claim that does not include particular machines.\textsuperscript{85}

However, it did not go as far as to say that transformation of matter is a prerequisite to the patentability of a process claim. Instead, the court said the following.

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a “different state or thing.” We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.\textsuperscript{86}

Here the court, albeit in an unclear and confusing fashion, rejected the argument that if its ‘prior precedents’ set down a requirement that invention must consist of a

\textsuperscript{84} Gottschalk v Benson, 409 US 63, 70 (1972) quoting Cochrane v Deener, 94 US 780, 788 (1876). Cochrane v Deener involved a process for processing flour so as to improve its quality, which is a process that involves a physical element. Thus, the court in Cochrane v Deener did not consider a non-physical process. The question before the court was whether the patented process would be infringed if the steps were performed using different machinery. The court held that the process would be infringed if all its steps were used, regardless of the form of machinery used. The quote from Cochrane v Deener relied upon by the Benson court reads in full: ‘That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.’

\textsuperscript{85} Ibid. Note that the court in Gottschalk v Benson said that ‘transformation… is the clue,’ (emphasis added) not transformation… is a clue.

\textsuperscript{86} Ibid 71.
machine or transformation of physical matter, that requirement should continue to be recognised. The court instead favoured a less-restrictive view of patentable subject matter that would not tie the patent system solely to mechanical processes of a past era.

It is said that the decision precludes a patent for any program servicing a computer. We do not so hold. It is said that we have before us a program for a digital computer but extend our holding to programs for analog computers. We have, however, made clear from the start that we deal with a program only for digital computers. It is said we freeze process patents to old technologies, leaving no room for the revelations of the new, onrushing technology. Such is not our purpose.  

The court then summarised its finding in general terms, noting that the process would only be of substantial practical application when used in connection with a computer.

What we come down to, in a nutshell, is the following. It is conceded that one may not patent an idea. But, in practical effect, that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that, if the judgment below is affirmed, the patent would wholly preempt the mathematical formula and, in practical effect, would be a patent of the algorithm itself.

The claim at issue was rejected as an attempt to wholly pre-empt the mathematical formula, and the discussion regarding transformation of an article appears to be obiter dicta. Given that the court did not discuss the point in any detail, all that can be taken as ratio decidendi from Gottschalk v Benson is that a claim to a mathematical formula that effectively pre-empts that formula is an unpatentable abstract or fundamental principle. However, obiter dicta or otherwise, here we have a statement from the

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87 Ibid.
88 Ibid 71-72.
Such a reading of *Gottschalk v Benson* is consistent with the earlier decisions of the Court of Customs and Patent Appeals (‘CCPA’) (the predecessor to the Federal Circuit), *In re Prater*,99 (‘Prater’) and *In re Musgrave*90 (‘Musgrave’). In *Musgrave* it was said that it would be a misreading of *Cochrane v Deener* to ‘to assume that “all processes, to be patentable, must operate physically upon substances”’.91

This presumes that the law requires all steps of a statutory “process” to be physical acts applied to physical things. We considered this matter in *Prater*. In the first opinion by Judge Smith we showed how this erroneous idea arose from a dictum in *Cochrane v. Deener*, 94 U.S. 780 (1876), and is inconsistent with several later Supreme Court opinions. In Judge Baldwin’s *Prater* opinion we readopted a large portion of Judge Smith’s opinion on this point and again pointed out that it was a misconstruction to assume that “all processes, to be patentable, must operate physically upon substances.”92

Despite its problems, the Supreme Court’s reasoning in *Gottschalk v Benson* was dutifully followed by the CCPA in cases such as *In re Maucorps*.93 and *In re Meyer*.94

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99 In re Prater, 415 F.2d 1393, 1403 (CCPA 1969).
91 Ibid citing In re Prater, 415 F.2d 1393 (CCPA 1969) and Cochrane v Deener, 94 US 780 (1876).
93 609 F.2d 481 (CCPA 1979). There the applicant claimed a ‘computing system for processing data’ that determined the optimum number of sales representatives for a given organisation as well as the number of times they should visit customers over a period of time. The court affirmed the rejection of the application on the basis that the ‘claimed invention as a whole comprised each and every means for carrying out a solution technique for a set of equations wherein one number is computed from a set of numbers’: at 486.
94 688 F.2d 789 (CCPA 1982) *In re Meyer* was decided using analogous reasoning to that used in *In re Maucorps*. The application disclosed a computer-based expert system for aiding a neurologist in diagnosing patients. The essence of the alleged invention was the accumulation of test data and conclusions to be reached in accordance with statistical formulae. The court affirmed the rejection of the application, describing it at 794 as ‘an attempt to patent a mathematical algorithm rather than a process for producing a product.’ Further, the court held at 795 that ‘a mental process that a neurologist should follow’ was not patentable as it was not directed to a ‘statutory process, machine, manufacture, or composition of matter.’ The court also described the alleged invention as unpatentable on the basis that it has ‘not been applied to physical elements or process steps’ despite the fact that one of the claims at issue specifically recited an apparatus comprising various means for carrying out the functions.
Physical Effect in Patent Law

Professor Chisum is of the view that *Gottschalk v Benson* is the source of confusion that exists in United States law as to how patentable subject matter is determined.\(^95\) In his view, the poor reasoning in *Gottschalk v Benson* stems from the fact that ‘the Court misunderstood the nature of the subject matter before it’.\(^96\) He considers that the court erred by characterising the method as having been directed to a mathematical problem.\(^97\) Instead, he believes that the process claimed ‘is more properly described as a translation problem -- comparable to converting temperature values from Fahrenheit to Celsius.’\(^98\)

Chisum argues against the court’s finding that the algorithm is unpatentable for being abstract because of the sweeping scope of its potential use. He points out that the sweeping scope of the algorithm’s potential use does not support the court’s inference that the algorithm is of an abstract nature.\(^99\) Secondly, he argues against the court’s objection that the algorithm’s only known substantial practical application is use within a digital computer.\(^100\)

But even if the potential direct uses are vast and not fully known at the time the patent is applied for, it is unclear why this should matter. Generally, in our patent system, an inventor must find one specific practical utility for a new product or process. However, once patentability is established, the patent will cover all uses of the claimed patent -- including those that were not or could not have been conceived of by the inventor. This occurs fairly commonly with inventions such as chemical compounds and materials.\(^101\)

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\(^96\) Chisum, above n 95, 1020.

\(^97\) Ibid 976.

\(^98\) Ibid 977 (‘It would seem that a conversion of decimal numbers to binary-coded numbers to binary numbers is a “mathematical” problem only in a very loose sense.’).

\(^99\) Ibid 984.

\(^100\) Ibid. See also Gruner, ‘Undiscovered Country’, above n 95, 404 (‘The observation that the method at issue in this case would probably not have applications outside the computer programming area is probably correct - if for no other reason than that manipulation of information in a similar manner in a human brain would be so tedious and prone to error that no one would undertake the method. But why this fact makes the method unpatentable is a mystery.’).

\(^101\) Ibid (footnotes omitted).
The process claimed in *Gottschalk v Benson* does not pre-empt all BCD to binary conversion techniques, or even all computer-implemented BCD to binary conversion techniques. It simply pre-empts the particular computer implemented BCD to binary conversion techniques claimed, thus is not an abstract claim or a claim that pre-empts a fundamental scientific or mathematical principle. Instead, the key to the patent eligibility of the Benson-Tabbot algorithm is, regardless of the uses to which the algorithm could be put, that it performs a useful automated manipulation of data from one format to another.

Chisum also criticised the court for including mental steps in the recognised categories of excluded matter, arguing that ‘there is no basis for lumping together phenomena of nature and abstract concepts with “mental steps.” A process consisting partially or wholly of “mental steps” does not exist in nature and can be quite specific.’\(^{102}\) Chisum’s criticism in this regard is persuasive. He points out the irrelevance of any attempts to analogise mental steps with the fundamental principles that govern the physical world or ideas that are abstract because they lack a practical application.

Chisum considers that the decision stemmed from ‘an antipatent judicial bias that cannot be reconciled with the basic elements of the patent system established by Congress.’\(^{103}\) Gruner considers that ‘the real problem that the Court had with the invention at stake in *Benson* was that it concerned computer programming, pure and simple without any further physical device details.’\(^{104}\) Whatever the cause, *Gottschalk v Benson* is an unfortunate and confusing starting point for determining the bounds of patentable subject matter.

### B Parker v Flook

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\(^{102}\) Ibid 981.

\(^{103}\) Ibid 961.

\(^{104}\) Gruner, ‘Undiscovered Country’, above n 95, 403.
A few years later the Supreme Court revisited the issue of patentable subject matter in *Parker v Flook*. There the court considered the patent eligibility of ‘a method of updating alarm limits’ in the catalytic conversion of hydrocarbons. During a conversion process, temperature and pressure readings need to be monitored to ensure they do not exceed ‘alarm limits’ indicating potentially dangerous conditions. An alarm limit is simply a number generated by the application of a formula. The respondent claimed a method of ‘updating’ the alarm limits during the conversion process. Using what was assumed to be a novel and useful algorithm, the updated alarm limit could be calculated if several other variables were known. The claimed utility of generating a correct alarm limit is that once a variable under scrutiny reaches a value that exceeds its alarm limit, an alarm signalling an abnormal condition indicating either inefficiency or danger is triggered.

The issue for the court was whether the invention claimed is a § 101 ‘process’. The court categorised the subject matter claimed narrowly, describing it as a method in which the only novel contribution involved is an ‘algorithm’ or ‘mathematical formula’ to which other ‘conventional post-solution’ steps were applied. The *Flook* court endorsed the description of the excluded matter given in *Gottschalk v Benson* that, ‘Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.’

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106 *Parker v Flook* 437 US 584, 585 (1978). The method in question is described as a ‘Method for Updating Alarm Limits.’ Claim 1 of the patent describes the method as follows:

1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of $B_0 + K$

   wherein $B_0$ is the current alarm base and $K$ is a predetermined alarm offset which comprises:

   (1) Determining the present value of said process variable, said present value being defined as $PVL$;

   (2) Determining a new alarm base $B_1$, using the following equation:

   $B_1 = B_0 (1.0 - F) + PVL(F)$

   where $F$ is a predetermined number greater than zero and less than 1.0;

   (3) Determining an updated alarm limit which is defined as $B_1 + K$; and thereafter

   (4) Adjusting said alarm limit to said updated alarm limit value.’ (reproduced in an appendix to the decision of *Parker v Flook* 437 US 584, 569 (1978)).

107 Ibid 585.

The court reasoned that since the ‘algorithm’ or ‘mathematical formula’ was the applicant’s only novel contribution, it held that in accordance with the decision in *Gottschalk v Benson*, it must be treated as though it were prior art even if the applicant was the first to formulate or discover it, and even though the claimed use does not cover every conceivable application of the formula. While the court acknowledged that, ‘a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm’, it held that since the added ‘post-solution’ activity was conventional and well known in the prior art, the invention could not encompass patentable subject matter.

Further, the court made clear that adding ‘insignificant post-solution activity’ to otherwise unpatentable subject matter will not make that subject matter patentable. This principle requires that the invention, being the advance over the prior art made by the inventor, be identified and extracted from any extraneous material contained in the description of the invention or claims that would otherwise confuse the reader as to the true scope of the inventor’s contribution.

The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.

This principle developed in response to patentees wanting to place a limit on the scope of their claims so as to avoid drafting unpatentable claims over all conceivable uses of an algorithm. This ensures a delineation between the inventive advance achieved and any extraneous limiting material the patentee has sought to introduce, so

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109 Ibid 589 ('Reasoning that an algorithm, or mathematical formula, is like a law of nature, Benson applied the established rule that a law of nature cannot be the subject of a patent.').
110 Ibid 590.
111 Ibid.
112 Ibid.
as to avoid improperly approving a patent over any of the excluded categories within a particular field of technology.\textsuperscript{113}

The court held the respondent’s invention to be unpatentable on the grounds that the only novel feature of the method is a mathematical formula and the only addition to the formula is conventional post-solution activity. The court said: ‘Respondent’s application simply provides a new and presumably better method for calculating alarm limit values,’\textsuperscript{114} which is not patentable because ‘if a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.’\textsuperscript{115}

In the course of judgment the court acknowledged in a footnote the statement made in \textit{Gottschalk v Benson} that a physical element is not a prerequisite to patentability and that the scope of patent eligibility is not tied to the narrow statement of principle espoused in \textit{Cochrane v Deener}.

An argument can be made, however, that this Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a ‘different state or thing.’ … As in \textit{Benson}, we assume that a valid process patent may issue even if it does not meet one of these qualifications of our earlier precedents.\textsuperscript{116}

Chisum is of the view that \textit{Parker v Flook} arguably suffers from the same faults as \textit{Gottschalk v Benson}, and both were wrongly decided because the court misunderstood the subject matter and wrongly focussed on the algorithm elements in

\textsuperscript{113} Although the Court identified ‘post-solution’ activity, the Federal Circuit has acknowledged that the principle is applicable to any insignificant extraneous activity irrespective of where it appears in a claimed process: \textit{In re Schrader}, 22 F.3d 290, 294 (Fed. Cir. 1994) (holding a simple recordation step in the middle of the claimed process insufficient to secure patent eligibility); \textit{In re Grams}, 888 F.2d 835, 839-840 (Fed. Cir. 1989) (holding a pre-solution step of gathering data insufficient to secure patent eligibility).

\textsuperscript{114} \textit{Parker v Flook} 437 US 584, 594-595 (1978).

\textsuperscript{115} Ibid 595 quoting \textit{In re Richman}, 563 F.2d 1026, 1030 (1977). The court incorrectly described the respondent’s claim as being comparable to a claim that the formula $2\pi r$ can be usefully applied in a method of calculating a wheel’s circumference.

\textsuperscript{116} Ibid 588-589 n 9 citing \textit{Gottschalk v Benson} 409 US 63, 71 (1972) and \textit{Cochrane v Deener}, 94 US 780, 787-788.
physical effect in patent law

By dissecting the invention to separate the formula from what it described as ‘post-solution activity’, the court did not properly consider whether the claimed invention as a whole would have been new and non-obvious to a person of ordinary skill experienced in the art. This mistake was not made by Stewart J in dissent, who recognised that ‘a claimed process [does not lose] its status of subject-matter patentability simply because one step in the process would not be patentable subject matter if considered in isolation.’ Further, the court also fell into error by commingling ‘distinct statutory provisions which are conceptually unrelated’, namely, those pertaining to the § 101 categories of invention and the remaining requirements for patentability, such as nonobviousness.

C Diamond v Chakrabarty

In *Diamond v Chakrabarty*, the Supreme Court held that new and non-obvious, live, artificial, human-made, genetically-engineered micro-organisms could be patented.

Burger CJ, writing the majority opinion, clearly signalled that the scope of patentable subject matter should be interpreted broadly. He said that:

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117 Chisum, above n 95, 992-995; cf Gruner, ‘Undiscovered Country’ above n 95, 406, who argues that ‘the Court’s emphasis in *Parker* was on the absence of physical instantiation of the method of calculation specified in the patent at issue, not on the need for a mathematical calculation that leads to a physical manipulation or step in every case where a patent is sought.’


119 In re Bergy, 563 F.2d 952, 959 (CCPA 1979) (Rich J) (‘We find in *Flook* an unfortunate and apparently unconscious, though clear, commingling of distinct statutory provisions which are conceptually unrelated, namely, those pertaining to the categories of inventions in § 101 which may be patentable and to the conditions for patentability demanded by the statute for inventions within the statutory categories, particularly the nonobviousness condition of § 103.’ (emphasis in original)).


121 Ibid 308-309. The ‘invention’ considered in *Diamond v Chakrabarty* is a genetically-modified bacterium capable of breaking down multiple components of crude oil. The micro-organism in question is ‘a bacterium from the genus *Pseudomonas* containing therein at least two stable energy-generating plasmids, each of said plasmids providing a separate hydrocarbon degradative pathway.’ It was considered to be genetically modified because the natural bacterium from the genus *Pseudomonas* did not contain two stable energy-generating plasmids, each providing a separate hydrocarbon degradative pathway. It was the addition of these two plasmids through human intervention which transformed a naturally-occurring phenomenon into an artificial bacterium not found in nature.
In choosing such expansive terms as “manufacture” and “composition of matter,” modified by the comprehensive “any,” Congress plainly contemplated that the patent laws would be given wide scope.\textsuperscript{122}

He then famously said that patentable subject matter comprises ‘anything under the sun that is made by man.’\textsuperscript{123} Thus, the Supreme Court in \textit{Diamond v Chakrabarty} recognised that the word ‘any’ used in § 101 allows for the patentability of any process, not just processes that are limited to the physical constraints of machines or physical transformation of matter.

Burger CJ was quick to reject any suggestion that the invention claimed is unpatentable because it may have been unforeseen when Congress enacted § 101, that Congress has not expressly authorised such protection, or that there might be public policy reasons for not allowing the patent. He said that arguments against patentability under § 101 based on the revolutionary nature of the invention or potential hazards that may be generated by genetic research should be addressed to the Congress and the executive, not the judiciary.\textsuperscript{124}

While prescribing a broad scope of patentable subject matter, his Honour made it clear that the Supreme Court has recognised that patentable subject matter is not without limits. While it may ‘include anything under the sun that is made by man’, it does not extend to laws of nature, natural phenomena, and abstract ideas, as laws of nature, natural phenomena and ideas of themselves are not patentable.\textsuperscript{125} The emphasis of the judgment is that to be patentable, an invention must be something that is ‘made by man’, meaning something new that is not pre-existing. It is also

\textsuperscript{122} Ibid 308. According to the Supreme Court, the Act embodied Jefferson’s ‘philosophy that ingenuity should receive a liberal encouragement.’ See also \textit{J.E.M. Ag Supply, Inc v Pioneer Hi-Bred International, Inc}, 534 US 124, 130 (2001) (in which the Supreme Court reiterated, quoting \textit{Diamond v Chakrabarty}, 447 US 303, 308 (1980) that that the language of § 101 is ‘extremely broad’ such that ‘Congress plainly contemplated that the patent laws would be given wide scope.’ In determining the eligibility of newly developed plant varieties the court declared at 145-146 that, ‘[a]s in \textit{Chakrabarty}, we decline to narrow the reach of § 101 where Congress has given us no indication that it intends this result.’).


\textsuperscript{124} Ibid 314-318.

\textsuperscript{125} Ibid 308-309 citing \textit{Gottschalk v Benson}, 409 US 63, 67 (1972); \textit{Parker v Flook}, 437 US 584 (1978) and \textit{Funk Bros Seed Co v Kalo Inoculant Co}, 333 US 127, 130 (1948).
worth noting that the description of the recognised categories of excluded matter did not include the ‘mental steps’ included in Gottschalk v Benson\(^{126}\) and Parker v Flook\(^{127}\).

Burger CJ allowed the patent, describing it as either a ‘manufacture’ or ‘composition of matter’.

Judged in this light, respondent’s micro-organism plainly qualifies as patentable subject matter. His claim is not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter—a product of human ingenuity “having a distinctive name, character, [and] use.”\(^{128}\)

The court made it clear that ‘artificiality’ in the sense of some human intervention was not enough. Unless the genetic modification resulted in an artificial bacterium displaying ‘markedly different characteristics from any found in nature’ that were useful, there was no invention.\(^ {129}\)

His Honour also put definitions to the § 101 terms, ‘manufacture,’ and ‘composition of matter.’ He held that when used in its verb form, ‘manufacture,’ means ‘the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery’ and ‘composition of matter’ as including ‘all compositions of two or more substances and… all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids.’\(^ {130}\)

D Diamond v Diehr

\(^{126}\) Gottschalk v Benson, 409 US 63, 67 (1972).
\(^{128}\) Ibid 309-310 citing Hartranft v Wiegmann, 121 US 609, 615 (1887).
\(^{129}\) Ibid 310.
\(^{130}\) Ibid 308 quoting American Fruit Growers, Inc. v Brogdex Co., 283 US 1, 11 (1931).
The third word in the Supreme Court’s trilogy on the patentability of algorithms came in 1981 in *Diamond v Diehr*. In *Diamond v Diehr*, the Supreme Court upheld a patent for a process of curing rubber in moulds controlled by a computer software program, thereby expressly recognising the patent eligibility of physically-transformative computer-implemented processes.

The invention considered in *Diamond v Diehr* is a process for moulding raw, uncured synthetic rubber into cured precision products, which includes the use of a programmed digital computer and a mathematical formula called Arrhenius’ equation to predict the necessary curing time for the rubber. The process uses a mould for precisely shaping the uncured material under heat and pressure. The synthetic rubber is cured in the mould so that the product will retain its shape. The claimed process differs from the prior art in that it involves constantly measuring the temperature inside the mould and feeding the temperature measurements into a computer that repeatedly recalculates the cure time by use of the mathematical equation and then signals a device to open the press at the proper time.

In considering the invention, the court overcame the errors made in *Gottschalk v Benson* and *Parker v Flook*, where it had previously categorised inventions according to the use of the algorithm involved. Instead, the court recognised that it must consider the invention as a whole, rather than dissect the claims into various elements. Therefore, the court focussed on the industrial nature of the invention claimed before it, rather than the fact that the invention involved a mathematical algorithm.

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131 450 US 175 (1981). Rehnquist J delivered the opinion of the court in which Burger CJ, and Stewart, White, and Powell JJ joined. Stevens J filed a dissenting opinion, in which Brennan, Marshall, and Blackmun JJ joined. It is interesting to note that the three dissenters in *Parker v Flook* (Stewart J, Burger CJ and Rehnquist J) were in the majority in *Diamond v Diehr*, marking somewhat of a swing in the approach to addressing patentable subject matter.


133 Ibid 187 (‘a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer.’).

134 Ibid 177-179.

135 Ibid 188.
We view respondents’ claims as nothing more than a process for molding rubber products, and not as an attempt to patent a mathematical formula.\(^\text{136}\)

Rehnquist J, who wrote on behalf of the majority, acknowledged that the Supreme Court had earlier recognised in *Diamond v Chakrabarty* that patentable subject matter includes ‘anything under the sun that is made by man’,\(^\text{137}\) and clarified the circumstances under which an algorithm may be patentable by stating that ‘laws of nature, natural phenomena, and abstract ideas’ are excluded from the categories of patentable invention until reduced to some type of practical application.\(^\text{138}\) Rehnquist J omitted from the list of recognised categories of excluded matter the ‘mental processes’ referred to in *Gottschalk v Benson*\(^\text{139}\) and *Parker v Flook*,\(^\text{140}\) but not listed in *Diamond v Chakrabarty*.\(^\text{141}\) He then declared that while a claim to a fundamental principle is unpatentable, ‘an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.’\(^\text{142}\) Thus, the *Diamond v Diehr* court drew a distinction between those claims that seek to pre-empt the use of a fundamental principle, on the one hand, and claims that seek only to foreclose others from using a particular application of that fundamental principle, on the other.\(^\text{143}\) In upholding the patentability of the invention, Rehnquist J explained that ‘[t]he “novelty” of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.’\(^\text{144}\)

Rehnquist J recognised that a mathematical algorithm may describe a law of nature, a scientific truth or abstract idea. However, he identified the distinction between a mathematical algorithm being claimed in the abstract and being applied in a claim to

\(^{136}\) Ibid 191. Chisum, above n 95, 995 describes this as the ‘purging’ of the errors made in *Gottschalk v Benson* and *Parker v Flook*.


\(^{139}\) *Gottschalk v Benson*, 409 US 63, 67 (1972).


\(^{143}\) Ibid.

\(^{144}\) Ibid 188-189.
a structure or process which, when considered as a whole, constitutes an invention of
the type set out in 35 USC § 101. He made two statements regarding this principle.

Firstly, field-of-use limitations are insufficient to impart patent eligibility to
otherwise unpatentable claims to fundamental principles. This statement was
directed to patentees who have attempted to limit their claims to a particular field of
technology to conceal that a fundamental principle has been claimed. In essence there
is no difference between pre-empting use of a fundamental principle in all fields and
pre-empting use of a fundamental principle in only one field. In both what is claimed
is not a specific application of the principle, but the principle itself.

Secondly, the court endorsed the finding in Parker v Flook that insignificant post-
solution activity can never transform unpatentable subject matter into patentable
subject matter. The court helpfully described the ‘insignificant post-solution activity’
referred to in Parker v Flook as ‘token’ activity that does not ‘constitute a part of the
inventive concept that the applicants claimed to have discovered.’

Rehnquist J declared the process patentable, and emphasised that it is industrial
processes such as these that have historically been eligible to receive the protection of
United States patent laws. His Honour’s analysis of subject matter turned on the
claim as a whole, which concerned the physical transformation of the rubber, not the
implementation of the algorithm in a computer program. He explained that the use
of a computer did not render the process unpatentable, but made clear, that where
software implemented in a computer is used to control a device that would otherwise
be patentable in its own right, the invention does not become unpatentable due to the

145 Ibid 191-192.
146 Ibid 191 (‘this principle [that a mathematical formula cannot be patented in the abstract] cannot be
circumvented by attempting to limit the use of the formula to a particular technological environment.’).
activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a
patentable process exalts form over substance.’).
149 Ibid 184 (‘Industrial processes such as this are the types which have historically been eligible to
receive the protection of our patent laws.’). Chisum, above n 95, 997 questioned how such a case ever
reached the United States Supreme Court on the issue of whether the claims were for statutory subject
matter, given that the claims were ‘clearly for an industrial, mechanical process of the sort that had
long been within the orbit of subject matter that could be patented.’
150 Ibid 192-193 (the final sentence of the court’s opinion makes clear that the applicant’s claims were
not regarded as being ‘an attempt to patent a mathematical formula, but rather to be drawn to an
industrial process for the molding of rubber products’).
fact a computer controls it.\textsuperscript{151} On the patentability of mathematical formulae and the prohibition on patenting abstract ideas, Rehnquist J acknowledged that the applicants did not seek to patent a mathematical formula, but instead claimed a process of curing synthetic rubber. While the process employs a well-known mathematical equation, it did not pre-empt the use of that equation.\textsuperscript{152}

Rehnquist J attempted to reconcile the court’s findings with the decision in \textit{Gottschalk v Benson}. The perceived difference between the claims in \textit{Diamond v Diehr} and those in \textit{Gottschalk v Benson} is that the Benson claims lack a ‘substantial practical application’ and that the patent ‘would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.’\textsuperscript{153} In \textit{Diamond v Diehr} however, it was thought that the applicant sought only the use of that equation in conjunction with all of the other steps in their claimed process for curing rubber.\textsuperscript{154}

Arrhenius’ equation is not patentable in isolation, but when a process for curing rubber is devised which incorporates in it a more efficient solution of the equation, that process is, at the very least, not barred at the threshold by § 101.\textsuperscript{155}

While it is clear that the process considered in \textit{Diamond v Diehr} involves a transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing,\textsuperscript{156} there is nothing in the judgment that suggests that a physical transformation of matter is a necessary prerequisite to patentability.\textsuperscript{157} On
the contrary, after repeating the statements made in *Cochrane v Deener*\(^{158}\) and *Gottschalk v Benson*,\(^{159}\) Rehnquist J indicated that physical transformation is but one form patent eligible subject matter may take.

On the other hand, when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.\(^{160}\)

Once again, we see a reference to ‘transforming or reducing an article’ only being made by way of example, indicated by the use of ‘e.g.’ suggesting that physical transformation is simply one expression of patentable subject matter, rather than mandatory.\(^{161}\) This clearly indicates that physical transformation is not the focus of patent eligibility, but is just one of the forms of innovation patent law is designed to protect.

**E   Subsequent Supreme Court Authority on the Breadth of Section 101**

Since its 1981 *Diamond v Diehr* decision, the Supreme Court has not heard a matter that concerns the patent eligibility of inventions that involve mathematical algorithms or requires an interpretation of the scope of patentable subject matter.

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\(^{158}\) *Diamond v Diehr*, 450 US 175, 183 (1981) quoting *Cochrane v Deener*, 94 US 780, 788 (1877) (‘A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing.’) reproduced in *Gottschalk v Benson*, 409 US 63, 70 (1972).

\(^{159}\) Ibid 184 quoting *Gottschalk v Benson*, 409 US 63, 70 (1972) (‘Transformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.’).

\(^{160}\) Ibid 192.

\(^{161}\) So much was inferred in the Federal Circuit’s decision in *AT&T Corp v Excel Communications, Inc*, 172 F.3d 1352, 1358-1359 (Fed. Cir. 1999). Stevens J, the author of the dissenting opinion disagreed: ibid 197 (‘the definition of “process” announced by this Court in *Cochrane v. Deener*, seemed to indicate that a patentable process must cause a physical transformation in the materials to which the process is applied.’) (citations omitted).
In *J.E.M. Ag Supply, Inc v Pioneer Hi-Bred International, Inc*, the alleged infringer of a patent for a newly-developed plant argued that the patent was invalid under § 101 because Congress provided patent protection for plants under two other statutes. The Supreme Court endorsed the view that the language of § 101 is ‘extremely broad’ such that ‘Congress plainly contemplated that the patent laws would be given wide scope.’ and rejected ‘the argument that Congress must expressly authorize protection for new patentable subject matter.’

In determining the eligibility of newly developed plant varieties the court declared that, ‘[a]s in *Chakrabarty*, we decline to narrow the reach of § 101 where Congress has given us no indication that it intends this result.’

### F Comment: Confusion as to Patent Eligibility Standards

The Supreme Court’s trilogy of algorithm cases is a confusing mix of decisions. According to Chisum, all the confusion that exists in the law surrounding the patentable subject matter standard can be traced back to *Gottschalk v Benson*, which he considers to be ‘poorly reasoned’ and a decision that ‘cannot be reconciled with the basic elements of the patent system established by Congress.’ He considers that *Gottschalk v Benson* is fundamentally inconsistent with the later decisions in *Diamond v Chakrabarty* and *Diamond v Diehr*.

Chisum’s primary objection to the reasoning in *Gottschalk v Benson* is that it cannot be assumed that every mathematical or other algorithm is a phenomenon of nature or an abstract concept, but that these are susceptible to specific practical application.

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162 534 US 124 (2001). Thomas J delivered the opinion of the Court, in which Rehnquist CJ and Scalia, Kennedy, Souter, and Ginsburg JJ joined. Scalia J filed a concurring opinion. Breyer J filed a dissenting opinion, in which Stevens J joined. O’Connor J took no part in the consideration or decision of the case.
163 Ibid 127.
165 Ibid 130.
166 Ibid 145-146.
167 Chisum, above n 95, 961-962, 977-978, 991-995. In this article, Chisum provides a much more detailed and comprehensive critique of the trilogy of algorithms than is presented here.
168 Ibid 980-981.
His secondary objection is that there is no basis for lumping together phenomena of nature and abstract concepts with mental steps.\(^{169}\)

Chisum considers that *Gottschalk v Benson* is a ‘vestige of another era’\(^{170}\) that stems from ‘an antipatent judicial bias that cannot be reconciled with the basic elements of the patent system established by Congress.’\(^{171}\) Chisum is not alone in his criticism of reasoning in the *Benson* opinion.\(^{172}\) Gruner considers that ‘the real problem that the Court had with the invention at stake in *Benson* was that it concerned computer programming, pure and simple without any further physical device details.’\(^{173}\)

Chisum also raises similar criticisms of the decision in *Parker v Flook*, which he blames on the court adopting the faulty characterisation and reasoning of *Gottschalk v Benson*. He says *Gottschalk v Benson* and *Parker v Flook* were wrongly decided because the court wrongly characterised the subject matter and wrongly focussed on the algorithm elements in each case. He complains that there is no basis for treating algorithms or mathematical formulae as prior art as the court did in *Parker v Flook*.\(^{174}\)

While they have an association with mathematics, an algorithm in general terms is a means of describing a process or set of instructions to achieve a particular result.\(^{175}\)

Putting aside questions of novelty and non-obviousness, it is difficult to see how the decisions in *Gottschalk v Benson* and *Parker v Flook* could have been decided in accordance with established precedent given that both involved processes that

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\(^{169}\) Ibid 981.

\(^{170}\) Ibid 991.

\(^{171}\) Ibid 961.

\(^{172}\) See for example: *In re Christensen*, 478 F.2d 1392, 1396 (CCPA 1973) (Rich J) (‘The Supreme Court in *Benson* appears to have held that claims drafted in such terms are not patentable -- for what reason remaining a mystery.’); *In re Johnston*, 502 F.2d 765, 773 (CCPA 1974) (Rich J) (dissenting) (‘I am probably as much -- if not more -- confused by the wording of the Benson opinion as many others.’). Pamela Samuelson, ‘Benson Revisited: The Case Against Patent Protection For Algorithms and Other Computer Program-Related Inventions’ (1990) 39 Emory Law Journal 1025, 1025 has also argued that the court did not clearly articulate its reasons, but argued that its decision should not be overruled. According to Gruner, ‘Undiscovered Country’, above n 95, 402, the court’s rationale was ‘essentially incoherent’.

\(^{173}\) Gruner, ‘Undiscovered Country’, above n 95, 403.

\(^{174}\) Chisum, above n 95, 992-995.

\(^{175}\) The court in *Gottschalk v Benson*, 409 US 63, 65 (1972) defined ‘algorithm’ as ‘a procedure for solving a given type of mathematical problem.’
produced useful, specific results not unlike the invention in *Diamond v Diehr*.\(^{176}\) However, while the court rectified the situation in *Diamond v Diehr*,\(^{177}\) uncertainty lingers because the existing Supreme Court precedents do not sit well together.\(^{178}\)

While an overly narrow reading of *Cochrane v Deener* may appear to limit the patent eligibility of processes to physical transformations, it must be remembered that in that case the court did not have non-physical process before it, and therefore is obiter.\(^{179}\) Therefore, that case should not be read as limiting processes to those involving only physical transformations, but rather as an example of a type of process that is patentable. Such a reading is consistent with the views expressed in *Diamond v Chakrabarty* that patent eligibility is flexible enough to accommodate all new and useful inventions.

The Supreme Court precedents display two lines of thought: one open and flexible; the other narrow and restrictive. The open and flexible approach that Chisum approves of is mainly that of Burger CJ, Stewart, Rehnquist and Powell JJ, who either contributed to the confusion or took no part in *Gottschalk v Benson*, dissented in *Parker v Flook*, and formed the majority in *Diamond v Chakrabarty* and *Diamond v Diehr*. The narrow and restrictive approach is mainly that of Douglas, Brennan, Marshall, Blackmun and Stevens JJ, who for the most part rejected the Benson-Tabbot algorithm in *Gottschalk v Benson*, wrongly dissected the claims in *Parker v Flook*, and dissented in *Diamond v Chakrabarty* and *Diamond v Diehr*. Given that a generation has passed since the Supreme Court last heard a case involving patentable subject matter, and the judges that constitute the court today is vastly different to what it was when the trilogy of algorithm cases was decided, it is difficult to make predictions as to what the opinions of those individual judges will be when the court hears *Bilski v Kappos*.\(^{180}\)

\(^{176}\) The inventions in all three cases seemingly facilitate inputting and manipulating data representing variables existing in the real world and outputting useful data that is or could be used in a useful industrial process.

\(^{177}\) Chisum, above n 95, 995 describes this as the ‘purging’.

\(^{178}\) Stevens J, the author of the *Flook* decision seems to insist that they do in his dissent in *Diamond v Diehr*. Rehnquist J also, in *Diamond v Diehr*, attempts to reconcile the disparate decisions.

\(^{179}\) *Cochrane v Deener*, 94 US 780, 791.

\(^{180}\) The case became *Bilski v Kappos* after David Kappos took office as Under Secretary of Commerce for Intellectual Property and Director, Patent and Trademark Office.
IV  THE FEDERAL CIRCUIT TAKES OVER: A CACOPHONY OF VIEWS

A  The ‘Failed’ Freeman-Walter-Abele Test

Before considering the decisions of the Federal Circuit, it is instructive to examine some of the cases decided by its predecessor, the CCPA. In three cases involving mathematical algorithms, the CCPA attempted to create a workable test to determine patentability that was intended to accommodate the three Supreme Court rulings regarding algorithms. This was the Freeman-Walter-Abele test, which, in its final form, involved: (1) determining whether the claim recites an ‘algorithm’ within the meaning of Gottschalk v Benson, then (2) determining whether that algorithm is ‘applied in any manner to physical elements or process steps.’

Through this test, the CCPA sought to accommodate the reasoning of the earlier Supreme Court cases by imposing a requirement that to be patentable, an algorithm must incorporate some physical elements or process steps in order to distinguish between algorithms that are mere ideas and true patentable inventions. This test aimed at assessing the pre-emptive scope of the patent under consideration and determining if its uses were appropriately limited. The rationale was that, if the use of the algorithm in accordance with the patent under consideration were limited to a specific physical context or set of process steps, the use of the algorithm in other contexts or steps would not be constrained by the patent.

It should be noted that in the cases that followed, In re Meyer, and Arrhythmia Research Technology, Inc. v Corazonix Corp., it was explained that the Freeman-

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181 Congress created the Federal Circuit in 1982 to hear all appeals from district court patent decisions as well as appeals from decisions of the BPAI: 28 USC § 1295 (1997). The aim of creating the Federal Circuit was to achieve consistency in patent decisions by consolidating appellate jurisdiction over patent cases in a single court, as opposed to patent appeals being heard in different federal districts: see Rochelle Cooper Dreyfuss, ‘The Federal Circuit: A Case Study in Specialized Courts’ (1989) 64 New York University Law Review 1.

182 The test was named after the three decisions in which it was formed: In re Freeman, 573 F.2d 1237 (CCPA 1978); In re Walter, 618 F.2d 758 (CCPA 1980); In re Abele, 684 F.2d 902 (CCPA 1982).

183 In re Abele, 684 F.2d 902, 905-907 (CCPA 1982).

184 According to Gruner, ‘Undiscovered Country’, above n 95, 410-411, this approach retained many of the ambiguities of Gottschalk v Benson. In particular, he thought the test lacked clarity regarding the types of computer-software based information processing algorithms that would be patentable and what would be sufficient limitations on the use of an algorithm that would make it be seen as not pre-empting all uses of the algorithm.

185 688 F.2d 789, 796 (CCPA 1982).
Walter-Abele test was not the only test for statutory subject matter and that the Federal Circuit has stated that a failure to meet that test would not always defeat a claim.\textsuperscript{187}

The Federal Circuit abandoned the Freeman-Walter-Abele test in 1998.\textsuperscript{188} It was later confirmed that this test is inadequate to determine whether subject matter is patent eligible.\textsuperscript{189}

\section*{B Arrhythmia}

In \textit{Arrhythmia Research Technology, Inc. v Corazonix Corp.},\textsuperscript{190} (\textit{Arrhythmia}), a three Federal Circuit judge panel comprising Newman, Lourie and Rader JJ unanimously confirmed the patent eligibility of a computer-assisted mathematical analysis of electrocardiograph signals that determined the likelihood of a heart attack recurring.

Writing on behalf of the majority, Newman J said that in considering whether a claim that involves a mathematical algorithm complies with 35 USC § 101, what must be determined is whether the claim describes a law of nature, a scientific truth, or an abstract idea. If it does, it must then be determined whether the claim is directed to a specific process or apparatus that is implemented in accordance with a mathematical algorithm. If so, it is statutory subject matter, otherwise it is not.\textsuperscript{191} Newman J explained that the question is not simply whether the claim wholly pre-empts a

\begin{itemize}
\item \textsuperscript{186}958 F.2d 1053, 1058 (Fed. Cir. 1992).
\item \textsuperscript{187}In re Grams, 888 F.2d 835, 839 (Fed. Cir. 1989).
\item \textsuperscript{188}State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1374 (Fed. Cir. 1998) (\textit{after Diehr and Chakrabarty, the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter}).
\item \textsuperscript{189}Initially, the test was seen to be inconsistent with the Federal Circuit’s broad views that the test for patentable subject matter should not be limited by physical constraints, see \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc.}, 149 F.3d 1368, 1373-1375 (Fed. Cir. 1998) (\textit{After Diehr and Chakrabarty, the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter}); \textit{AT&T Corp v Excel Communications, Inc}, 172 F.3d 1352, 1359 (Fed. Cir. 1999). However, it would appear that the test is now thought to be inadequate because it appears to conflict with the Supreme Court’s requiring analysis of a claim as a whole in § 101 analysis, see \textit{Parker v Flook}, 437 US 584, 594 (1978); \textit{In re Bilski}, 545 F.3d 943, 958-959 (Fed. Cir. 2008) (\textit{Indeed, we have already recognized that a claim failing that test may nonetheless be patent-eligible. See In re Grams, 888 F.2d 835, 838-39 (Fed. Cir. 1989).}).
\item \textsuperscript{190}958 F.2d 1053 (Fed. Cir. 1992) (Newman, Lourie and Rader JJ). Newman J filed an opinion on behalf of the court. Rader J filed a concurring opinion.
\item \textsuperscript{191}Ibid 1057-1058.
\end{itemize}
mathematical algorithm, but whether the claim is directed to a new and useful process.\textsuperscript{192}

Applying the \textit{Freeman-Walter-Abele} protocol, Newman J held that the claimed method comprises an otherwise statutory process whose mathematical procedures are applied to physical process steps.\textsuperscript{193} The court held that the plaintiff’s apparatus claims also satisfied the criteria for statutory subject matter since they are directed to a specific apparatus of practical utility and specified application.\textsuperscript{194}

Even though she applied the \textit{Freeman-Walter-Abele} physicality test, Newman J explained that the test is not the only test for statutory subject matter,\textsuperscript{195} and that the Federal Circuit has stated that a failure to meet that test would not always defeat a claim.\textsuperscript{196}

In his concurring opinion, Rader J declined to adopt the \textit{Freeman-Walter-Abele} physicality test, preferring instead to rely ‘on the basis of the patentable subject matter standards in title 35.’\textsuperscript{197} According to Rader J, ‘any’ invention or discovery within the four broad categories of ‘process, machine, manufacture, or composition of matter’ is eligible for patent protection, and the focus of patentability is on the other ‘conditions and requirements’ of Title 35.

The limits on patentable subject matter within section 101 focus not on subcategories of machines or processes, but on characteristics, such as newness and usefulness. Section 101 also specifies that, in addition to newness and usefulness, an invention or discovery must satisfy other “conditions and requirements.” These other “conditions and requirements” encompass characteristics like nonobviousness under 35 U.S.C. § 103 (1988), or requirements like those in 35 U.S.C. § 112 (1988). In other words, the

\textsuperscript{192} Ibid 1059.
\textsuperscript{193} Ibid 1058-1059.
\textsuperscript{194} Ibid 1060-1061.
\textsuperscript{195} Ibid 1058 citing \textit{In re Meyer}, 688 F.2d 789, 796 (CCPA 1982).
\textsuperscript{196} Ibid citing \textit{In re Grams}, 888 F.2d 835, 839 (Fed. Cir. 1989).
\textsuperscript{197} \textit{Arrhythmia Research Technology, Inc. v Corazonix Corp.}, 958 F.2d 1053, 1062 (Fed. Cir. 1992).
language of the Patent Act does not suggest that the words “machine” or “process” carry limitations outside their ordinary meaning.\textsuperscript{198}

On this basis, Rader J showed that there is no need to rely on proxy tests the Freeman-Walter-Abele protocol to determine statutory subject matter, but rather the correct approach according to law is that set out in the statute itself.

\textit{C Schrader}

The Federal Circuit confronted the outer bounds of statutory processes in \textit{In re Schrader} (‘Schrader’)\textsuperscript{199} in 1994. In a split decision, the Federal Circuit by majority held that a supposedly novel method that allowed competitive bidding at an auction on a number of related items failed to recite a statutory process,\textsuperscript{200} because it did not involve a physical effect or give a physical result.\textsuperscript{201}

According to the algorithm claimed, a combination of winning bids is determined by assembling a ‘completion’ from all the entered bids, being the particular combination of bids which would complete a sale of all of the items being offered at the highest offered total price (maximising the seller’s revenue). No specific machine or apparatus was recited. The method as claimed does not invoke or require the use of a computer or other calculating device. It is a method that can be performed mentally as it does not produce a physical effect or cause a physical transformation of matter, other than in recording the bids on each item, although no particular manner of recording (say, on paper or on computer) was specified in the patent application.

According to the Federal Circuit, when Congress approved the addition of the term ‘process’ to the categories of patentable subject matter in 1952, it incorporated the definition that had evolved in the courts, which the majority believed required a ‘transformation or reduction of subject matter.’\textsuperscript{202} In relation to the type of physical transformation required, the court noted that the ‘only physical effect or result which

\begin{itemize}
  \item \textsuperscript{198} Ibid 1061-1062 citing \textit{Diamond v Diehr}, 450 US 175, 182 (1981).
  \item \textsuperscript{199} 22 F.3d 290 (Fed. Cir. 1994) (Newman, Mayer and Plager JJ). Plager J wrote on behalf of the majority. Newman J filed a dissenting opinion.
  \item \textsuperscript{200} Ibid 296.
  \item \textsuperscript{201} Ibid 295-296.
  \item \textsuperscript{202} Ibid 295.
\end{itemize}
is required by the claim is the entering of bids in a “record,” a step that can be accomplished simply by writing the bids on a piece of paper or a chalkboard.\[^{203}\]

Making reference to the point recognised in *Parker v Flook*, that reciting insignificant post-solution activity in a claim involving a mathematical algorithm could not impart patentability to the claim, the court dismissed this activity as insufficient to convert the algorithm into something deserving of a patent. In doing so, the court recognised that the data stored in a ‘record’ would not be representative of any physical object in the real world when it said, ‘there is nothing physical about bids per se.’\[^{204}\] As there was nothing physical about the claim before it, the court rejected it as nonstatutory.\[^{205}\]

Newman J filed a dissenting opinion, in which she put forward a very different theory as to the basis of patentable subject matter. She argued that ‘a statutory “process” is limited only in that it must be technologically useful’ and that ‘the requirements of section 101 are met when the formula is applied in a technological process to produce a useful result.’\[^{206}\] She went on to say:

Schrader’s claimed process requires the performance of specified steps and procedures, including calculations, to achieve a technologically useful result; it is not a mathematical abstraction. As stated in *Diamond v. Diehr*, subject matter does not become nonstatutory “simply because it uses a mathematical formula” in an otherwise statutory process.\[^{207}\]

Thus, her Honour found that questions of physicality are immaterial in § 101 analysis. Her Honour also, in some sense, pre-empted the *State Street* decision by arguing that the business method exception should be laid to rest. In place of subject matter concerns, her Honour put forward the remaining strictures of novelty, nonobviousness and the need to properly describe the invention as the appropriate focus when determining patentability.

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\[^{203}\] Ibid.

\[^{204}\] Ibid 293-294. The court also said, ‘For purposes of Section 101, such activity is indistinguishable from the data gathering steps which we said in *In re Grams*... were insufficient to impart patentability to a claim involving the solving of a mathematical algorithm.’

\[^{205}\] Ibid 294-296.


[The business method exception is] an unwarranted encumbrance to the definition of statutory subject matter in section 101, my guidance is that it be discarded as error-prone, redundant, and obsolete. It merits retirement from the glossary of section 101. The decisions that have spoken of “methods of doing business” have, or could have, resolved the issue in each case simply by relying on the statutory requirements of patentability such as novelty and unobviousness. … I discern no purpose in perpetuating a poorly defined, redundant, and unnecessary “business methods” exception, indeed enlarging (and enhancing the fuzziness of) that exception by applying it in this case. All of the “doing business” cases could have been decided using the clearer concepts of Title 35. Patentability does not turn on whether the claimed method does “business” instead of something else, but on whether the method, viewed as a whole, meets the requirements of patentability as set forth in Sections 102, 103, and 112 of the Patent Act.

This statement made by her Honour in dissent arguably paved the way for clarity of thought and clarity of principle to emerge in the debate over the role of subject matter.

D  Alappat

In the landmark case of In re Alappat209 (‘Alappat’), the Federal Circuit sitting en banc articulated an expansive scope of patent eligibility for computer software-related art. The court upheld the validity of a means of using an anti-aliasing algorithm to create a smooth waveform display, rather than a jagged image, on the screen of a digital oscilloscope. The invention is comparable to a television having a clearer picture. It utilises existing computer systems and hardware. The only novel components are information processing sequences.210

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208 Ibid 297-298 (footnotes omitted).
209 33 F.3d 1526 (Fed. Cir. 1994) (en banc). The court was split 6:2 in favour of patentability, with three judges taking no position. Rich J filed an opinion on behalf of the majority, with whom Newman, Lourie, Michel, Plager and Rader JJ joined. Archer CJ and Nies J, dissented, while Mayer, Clevenger and Schall JJ took no position, having decided that the court lacked jurisdiction.
210 Ibid 1537. The facts are similar to those considered in the earlier decision of the Federal Court of Australia, International Business Machines Corporation v Commissioner of Patents (1991) 33 FCR 218, in which a similar invention to display a smooth curve on a computer screen was held to be patentable.
In its analysis, the court acknowledged the three categories of excluded subject matter recognised in *Diamond v Diehr*, ‘laws of nature, natural phenomena, and abstract ideas’. Further, it made clear that there is no general prohibition on patents involving mathematical algorithms. Rather, the court interpreted the Supreme Court’s cases as maintaining that a disembodied mathematical concept representing nothing more than a ‘law of nature’ or an ‘abstract idea’ will not be patentable until it has been reduced to some practical application rendering it ‘useful.’ In allowing the patent, the court substantially relaxed the physicality requirement of the *Freeman-Walter-Abele* test.

The court attempted to express this concept in what might be termed a ‘proxy test’ that was to be generally applicable for identifying patentable subject matter. The new test was, that to be patentable subject matter, an invention must produce a ‘useful, concrete and tangible result’. This is a test that would cause a decade of confusion before being rejected. *Alappat* was the first decision that made use of the words, ‘a useful, concrete and tangible result’, having been decided prior to *State Street*.

The language of the ‘useful, concrete and tangible result’ test was merely intended to be an expression of the principle enunciated in *Diamond v Diehr*, that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application. The court said:

> the proper inquiry in dealing with the so called mathematical subject matter exception to Section 101 alleged herein is to see whether the claimed subject matter as a whole is a disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a “law

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212 Ibid 1543 (‘[The Supreme Court] never intended to create an overly broad, fourth category of [mathematical] subject matter excluded from § 101.’).
213 Ibid 1543-1544.
214 Ibid 1544.
of nature,” “natural phenomenon,” or “abstract idea.” If so, *Diehr* precludes the patenting of that subject matter.\(^{215}\)

Applying this test, the court found that the claimed invention produces a ‘useful, concrete and tangible result’ rather than an abstract idea and is therefore patentable subject matter.

This is not a disembodied mathematical concept which may be characterized as an “abstract idea,” but rather a specific machine to produce a useful, concrete, and tangible result.\(^{216}\)

In short, the Federal Circuit in *Alappat* viewed patent eligibility as an assessment of whether an advance is practically useful, in the sense of being applied to a particular use, and that this is the enquiry that distinguishes patent eligible subject matter from unpatentable abstract ideas, fundamental principles of nature and naturally occurring phenomena. It would appear that the court considered, like Newman J had in *Schrader*, that a failure to render a observable physical effect was simply not relevant.

Finally, the court explained the place that software running on a general purpose computer occupies in patent law. It held that programming a general purpose computer:

creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software… Consequently, a computer operating pursuant to software may represent patentable subject matter, provided, of course, that the claimed subject matter meets all of the other requirements of Title 35. In any case, a computer, like a rasterizer, is apparatus not mathematics.\(^{217}\)

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\(^{215}\) Ibid.
\(^{216}\) Ibid.
\(^{217}\) Ibid 1558.
By this statement, the court swept away any concern that that software programs should be excluded from patent-eligibility for lack of physical effect or transformation.

E State Street

In its controversial 1998 State Street decision, the Federal Circuit opened the door to business method patents. In a decision written by the extremely well respected and experienced Rich J, the Federal Circuit held a machine-implemented data processing system that used a mathematical algorithm to implement a financial investment structure in computer software to be patentable subject matter. In so doing, Rich J relied on the test he had created in Alappat and held that an invention will be patentable if it produces a ‘useful, concrete, and tangible result’, a test the court left undefined.

Signature Financial Group Inc (‘Signature’) obtained the patent in question (the ‘056 patent’) in 1993. The invention claimed in the ‘056 patent is a computerised ‘hub and spoke’ system of financial investment and reporting implemented in computer software. The invention is not just a computerised mathematical algorithm, but is also a method of doing business that coordinates the central investment of funds from multiple financial institutions. Signature’s patented system purports to allow administrators to ‘monitor and record the financial information flow and make all

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218 State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), cert. denied 525 US 1093 (1999). The case was heard before a three judge panel of Rich, Plager and Bryson JJ. Rich J filed an opinion on behalf of the court.
219 Ibid 1373.
220 United States Patent No. 5,193,056 (Issued March 9, 1993) (‘Data processing system for hub and spoke financial services configuration’).
221 United States Patent No. 5,193,056 (issued March 9, 1993) (‘Data processing system for hub and spoke financial services configuration’). The first claim provides:

1. A data processing system for managing a financial services configuration of a portfolio established as a partnership, each partner being one of a plurality of funds, comprising:
   (a) computer processor means for processing data;
   (b) storage means for storing data on a storage medium;
   (c) first means for initializing the storage medium;
   (d) second means for processing data regarding assets in the portfolio and each of the funds from a previous day and data regarding increases or decreases in each of the funds, [sic, funds’] assets and for allocating the percentage share that each fund holds in the portfolio;
   (e) third means for processing data regarding daily incremental income, expenses, and net realized gain or loss for the portfolio and for allocating such data among each fund;
   (f) fourth means for processing data regarding daily net unrealized gain or loss for the portfolio and for allocating such data among each fund; and
   (g) fifth means for processing data regarding aggregate year-end income, expenses, and capital gain or loss for the portfolio and each of the funds.
calculations necessary for maintaining a partner fund financial services configuration. In addition, it tracks ‘all the relevant data determined on a daily basis for the Hub and each Spoke, so that aggregate year end income, expenses, and capital gain or loss can be determined for accounting and for tax purposes for the Hub and, as a result, for each publicly traded Spoke.’ Due to the complexity of the calculations necessary, a computer or equivalent device is needed to perform the invention.

Signature’s invention marked no advance in computer technology or the development of mathematical calculations. The basis for patentability was the uniqueness of the investment package Signature claimed in its patent and the fact that a complicated investment structure could be automated in this way. Unlike the invention in Alappat, there is no physically observable display claimed since nothing was to appear on a computer screen. The only connections with the outside world are that the system would need a general-purpose computer to run and that useful information outputted would form the basis of investment decisions that have financial consequences.

After the patent issued, Signature entered into licensing negotiations with State Street Bank that were ultimately unsuccessful. A dispute arose when State Street Bank sought a declaration that Signature’s patent was invalid. The District Court of Massachusetts granted a motion for partial summary judgment, declaring Signature’s

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222 State Street Bank & Trust Co v Signature Financial Group Inc., 149 F.3d 1368, 1371 (Fed Cir 1998).
223 Ibid.
224 Ibid.
patent invalid.\textsuperscript{225} On appeal, the Federal Circuit reversed the District Court’s grant of partial summary judgment and remanded the case.\textsuperscript{226}

Rich J, on behalf of a three-judge Federal Circuit panel, wrote that Congress’s intent was not to place restrictions on the subject matter inquiry that do not specifically appear in § 101.

The repetitive use of the expansive term “any” in § 101 shows Congress’s intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in § 101 and the other parts of Title 35. Indeed, the Supreme Court has acknowledged that Congress intended § 101 to extend to “anything under the sun that is made by man.” Thus, it is improper to read into § 101 limitations as to the subject matter that may be patented where the legislative history does not indicate that Congress clearly intended such limitations.\textsuperscript{227}

His Honour argued that the focus of § 101 is the useful result achieved and endorsed the ‘useful, concrete, and tangible result’ test relied on in \textit{Alappat}. He found that, although the patent involves the use of a mathematical algorithm, it had not claimed an abstract idea, but claimed a programmed machine that produces a ‘useful, concrete and tangible result.’\textsuperscript{228} In upholding the validity of the patent, he famously said:

\begin{flushright}
\textit{State Street Bank and Trust Co. v. Signature Financial Group, Inc., 927 F. Supp. 502, 514 (D. Mass. 1996). The District Court gave two reasons for doing so. First, it stated that the patent claimed a ‘mathematical algorithm’ (at 506) that does not ‘involve the transformation or conversion of subject matter representative of or constituting physical activity or objects’ (at 514, quoting \textit{In re Schrader}, 22 F.3d 290, 294 (Fed. Cir. 1994)). The court said that the invention involves no further physical transformation or reduction than inputting numbers, calculating numbers, outputting numbers, and storing numbers and that the same functions could be performed, albeit less efficiently, by an accountant armed with pencil, paper, calculator, and a filing system. Second, the court stated that the patent claimed a business method and there is a long established principle that business methods are unpatentable abstract ideas. The court held at 515-516 that ‘patenting an accounting system necessary to carry on a certain type of business is tantamount to a patent on the business itself. Because such abstract ideas are not patentable, either when regarded as methods of doing business or as mathematical algorithms, the ’056 patent must fail.’).}
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\textsuperscript{225} \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1377 (Fed. Cir. 1998).}


\textsuperscript{228} Ibid quoting \textit{In re Alappat}, 33 F.3d 1526, 1544 (Fed. Cir. 1994).
Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces “a useful, concrete and tangible result” -- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.\(^{229}\)

In reaching this conclusion, his Honour said it is of little importance whether a claim is directed to a ‘machine’ or a ‘process’ so long as it falls within at least one of the four enumerated categories of patentable subject matter and is of practical utility.

The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to -- process, machine, manufacture, or composition of matter -- but rather on the essential characteristics of the subject matter, in particular, its practical utility.\(^{230}\)

According to Rich J, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it non-statutory subject matter, where it produces a ‘useful, concrete and tangible result.’ Thus, the invention in State Street was held to be patentable as a result of the useful result it achieved, despite not falling within the traditional expectations that patents involve machines or methods that transform physical objects from one state to another.

Prior to the State Street decision, it was widely thought that systems of doing business, as a class, were not patentable.\(^{231}\) The State Street court held that it was a

\(^{229}\) Ibid 1373.
\(^{230}\) Ibid 1375.
\(^{231}\) The basis of that commonly held belief is said to be the decision of Hotel Security Checking Co. v Lorraine Co. 160 F. 467 (2d Cir. 1908). In this case, a patent over a method of handling order slips in a restaurant was sought. Slips of paper were assigned to each waiter, along with a unique number, and both were used to track orders and receipts controlled by the cashier. The case involved a patent that claimed a system of printed forms used to ‘prevent fraud and speculation by waiters and cashiers in hotels and restaurants.’ The court held that this system lacked novelty as it was already practiced in the restaurant business. The court also stated that this patent would not satisfy the element of obviousness,
mistake to reject a patent solely because it could be classed as a ‘business method’. Rich J rejected any suggestion of the validity of a business method exception when he said:

We take this opportunity to lay this ill-conceived exception to rest.

Instead, he held that methods of doing business are to be treated in the same way as other inventions. In doing so, the court approved the view taken in the dissenting judgment of Newman J in Schrader. Rich J explained, as Newman J had done, that each of the cases that appeared to rely on the business method exception as being capable of being rejected on some other ground, such as the rule against patenting abstract ideas.

Rich J refused to recognise a blanket exception that would exclude ‘mathematical algorithms’ as a class from patent eligibility. He said that the Supreme Court has

as would naturally have evolved in the restaurant business. By way of obiter dicta, the court, likening the system to bookkeeping, said that a method of doing business is ineligible for patent protection, as ‘a system of transacting business disconnected from the means of carrying out the system’ does not constitute patentable subject matter. However, for nearly the next 90 years, there was a presumption that business methods were not patentable subject matter unless embodied in some physical form, despite the courts never having endorsed such a proposition. Instead, it would appear that the court’s chief concern was not that a business method was involved, but that there was a lack of a physical nexus between the mental steps to achieve the end result and the paper slips utilised. According to Newman J in Schrader, a clearer statement was made in In re Patton, 127 F.2d 324, 327 (CCPA 1942) that a system for transacting business, separate from the means for carrying out the system, is not patentable subject matter, but the jurisprudence does not require the creation of a distinct business class of unpatentable subject matter. See also decisions that predate Hotel Security: Ex parte Abraham, 1868 Comm’r Dec. 59, 59 (Comm’r Pat. 1868), in which the Patent Commissioner declared that ‘it is contrary to the spirit of law ... to grant patents for methods of book-keeping’.

232 State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1375 (Fed. Cir. 1998).
233 Ibid.
234 Ibid n 10 citing In re Schrader 22 F.3d 290, 298 (Fed. Cir. 1994) (Newman J) (‘As Judge Newman has previously stated, [The business method exception] is … an unwarranted encumbrance to the definition of statutory subject matter in section 101, that [should] be discarded as error-prone, redundant, and obsolete. It merits retirement from the glossary of section 101. … All of the “doing business” cases could have been decided using the clearer concepts of Title 35. Patentability does not turn on whether the claimed method does “business” instead of something else, but on whether the method, viewed as a whole, meets the requirements of patentability as set forth in Sections 102, 103, and 112 of the Patent Act.’). See above n 211 and accompanying text.
235 Ibid 1375-1376 (Fed. Cir. 1998); In re Schrader, 22 F.3d 290, 297-298 (Fed. Cir. 1994) (Newman J) (dissent). See also Rinaldo Del Gallo, ‘Are Methods of Doing Business Finally Out of Business as a Statutory Rejection?’ (1998) 38 IDEA 403, 435 (‘The so-called “business method” cases, without exception, have been decided on grounds other than subject matter eligibility such as novelty, definiteness or obviousness.’); Michael Risch, ‘Everything is Patentable’ (2008) 75 Tennessee Law Review 591, 598 (‘Virtually all of the important historical patentable subject matter cases may be explained by applying each of the other requirements for patentability.’).
identified three categories of subject matter that are unpatentable, namely ‘laws of
nature, natural phenomena, and abstract ideas’, and that mathematical algorithms
will only be excluded from patentability ‘to the extent that they are merely abstract
ideas’. He emphasised that it was not a mathematical algorithm, formula or
calculation that was being claimed, but the transformation of data by a machine that
produced a ‘useful, concrete and tangible result’.

The utility of the patent comprised the financial advantages the system, such as the
desirable tax consequences of the business structure, the increased profits and the
convenient management of the funds. It was decided that the result was useful
notwithstanding that it was expressed as numbers, such as prices, percentages, profits
or losses.

The court in *State Street* emphasised that the question of whether or not an algorithm
lacks physical embodiment was not of importance. It declared that the physicality
doctrine known as the *Freeman-Walter-Abele* test was inconsistent with the decisions
in *Diamond v Diehr* and *Diamond v Chakrabarty*.

The District Court below had assumed the existence of per se rules of unpatentable
subject matter, patentability being determined mainly by considering whether there
was a ‘transformation’ that was ‘sufficiently physical to warrant patent protection’.
This proposition was clearly rebuffed by the Federal Circuit. The Federal Circuit
noted the District Court’s remarks that the hub and spoke patent was sufficiently
broad ‘to foreclose virtually any computer-implemented accounting method
necessary to manage this type of financial structure.’ However, the court stated that
the issue of whether the claims are too broad is not relevant to the question of

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238 Ibid 1373.
239 Ibid.
240 Ibid 1373-1374 (‘After *Diehr* and *Chakrabarty*, the *Freeman-Walter-Abele* test has little, if any,
applicability to determining the presence of statutory subject matter’).
1996).
whether those claims relate to statutory subject matter, but are relevant to the issues raised under sections 102, 103 and 112.²⁴²

Of course, the invention in question in State Street is not wholly divorced from physical matter. The case involved ‘the transformation of data, representing discrete dollar amounts, by a machine’. The claims under consideration require machines, being general-purpose computers, to execute the invention due to the complexity of the calculations involved and the need to achieve output in a timely fashion.²⁴³ Thus, the ratio decidendi of State Street is strictly limited to inventions involving a machine-implemented business process and does not extend to process claims.²⁴⁴

The ‘useful, concrete and tangible result’ test needs to be understood for what it is. It does not appear that Rich J intended the three adjectives, ‘useful’, ‘concrete’ and ‘tangible’, to be separate requirements each to be interpreted individually. Rather, the test is just a shorthand label to name the principle enunciated in Diamond v Diehr, that while a claim to a fundamental principle is unpatentable, ‘an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.’²⁴⁵ State Street is not authority for the proposition that usefulness is the sole criterion of patent eligibility. It is authority for the proposition that patent eligibility will be satisfied where a ‘new and useful’ invention that lies within useful arts, but not within the recognised categories of excluded matter, is disclosed. In 1999, the United States Supreme Court impliedly endorsed Rich J’s

²⁴² State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1377 (Fed. Cir. 1998).
²⁴³ All claims directed to ‘pure methods’ (being methods that do not rely on the presence or use of a machine) were removed prior to the matter going before the District Court of Massachusetts.
²⁴⁴ There had been confusion as to whether the Federal Circuit in State Street considered the patent in question to be a machine or process claim. However, from the judgment it is clear that the court considered the patent to be for a machine claim: State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1373 (Fed. Cir. 1998); (‘Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a [patent-eligible invention]’). The court also noted at 1373 that Alappat, 33 F.3d 1526 (Fed Cir 1994) and Arrhythmia Research Technology, Inc v Corazonix Corp 958 F.2d 1053 (Fed Cir 1992) involved machine claims, rather than processes. It was clarified that the claimed invention in State Street is a machine claim: In re Bilski, 545 F.3d 943, 959 n 18 (Fed. Cir. 2008) (en banc).
approach when it allowed the *State Street* decision to remain the law of the land when it denied certiorari.\(^{246}\)

F  *AT&T v Excel*

The Federal Circuit revisited the subject of patentable subject matter in the context of the manipulation of data by computer software in *AT&T v Excel.*\(^{247}\) There it unanimously affirmed that the ‘useful, concrete, and tangible result’ test applied in *Alappat* and in *State Street* is the approach to take when determining whether an invention discloses patentable subject matter. By doing so, it held that the ‘useful, concrete, and tangible result’ test is the approach to take when considering the patent eligibility of process claims.

The invention considered in *AT&T v Excel* is designed to operate in a telecommunications system with multiple long-distance service providers. AT&T’s claimed invention is a method by which a telephone company can determine whether both the caller and the recipient of a long-distance call are subscribers to the company’s telephone network.\(^{248}\) The telephone company could discount the fee for such a call in order to encourage individuals to subscribe to the phone company’s services.\(^{249}\)

\(^{246}\) *State Street Bank & Trust Co. v Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998); *cert denied*, 119 S Ct 851 (1999).

\(^{247}\) *AT&T Corp. v Excel Communications, Inc* 172 F.3d 1352 (Fed. Cir. 1999) (Plager, Clevenger and Rader JJ). Plager J delivered the court’s unanimous opinion.

\(^{248}\) US Patent No. 5,333,184 (issued 26 July 1994) (‘Call message recording for telephone systems’).

Claim 1 of the patent recited: A method for use in a telecommunications system in which interexchange calls initiated by each subscriber are automatically routed over the facilities of a particular one of a plurality of interexchange carriers associated with that subscriber, said method comprising the steps of: generating a message record for an interexchange call between an originating subscriber and a terminating subscriber, and including, in said message record, a primary interexchange carrier (PIC) indicator having a value which is a function of whether or not the interexchange carrier associated with said terminating subscriber is a predetermined one of said interexchange carriers.

\(^{249}\) The invention relied upon the fact that the telephone network contemporaneously maintains billing records when a customer makes a long-distance telephone call. These records include the originating and terminating telephone numbers, the duration of the call and an individual’s chosen ‘primary interexchange carrier’ or long-distance service provider. The claimed invention called for the addition of a discrete item of data, termed the ‘PIC indicator’ to the billing record maintained by the telephone network. The value of the PIC indicator was determined by applying the logical ‘AND’ function to the data identifying the primary interexchange carriers of the originator and recipient of the call. The PIC indicator initially is given the value ‘zero.’ If both customers subscribed to the same phone company, the PIC indicator is set to the value ‘one.’ Otherwise the PIC indicator remains ‘zero.’ The phone company could then apply the discounted call rate to any call in which the PIC indicator is set to ‘one’.
Writing for a three-judge majority, Plager J began by acknowledging that the Supreme Court has construed § 101 broadly, noting that Congress intended statutory subject matter to ‘include anything under the sun that is made by man’ and reaffirmed the principles the Supreme Court enunciated in *Diamond v Diehr*.

Plager J addressed the changing nature of technological development brought on by advances in information technologies. He was critical of previous decisions that sought to strike out patents involving algorithms on subject matter grounds. Addressing the patentability of mathematical algorithms, Plager J explained the ‘straightforward’ concept on which previous decisions, including *State Street* were based, ‘namely, that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application.’

Thus, the *Alappat* inquiry simply requires an examination of the contested claims to see if the claimed subject matter as a whole is a disembodied mathematical concept representing nothing more than a “law of nature” or an “abstract idea,” or if the mathematical concept has been reduced to some practical application rendering it “useful.” In *Alappat*, we held that more than an abstract idea was claimed because the claimed invention as a whole was directed toward forming a specific machine that produced the useful, concrete, and tangible result of a smooth waveform display.

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252 Ibid 1356 (‘Since the process of manipulation of numbers is a fundamental part of computer technology, we have had to reexamine the rules that govern the patentability of such technology. The sea-changes in both law and technology stand as a testament to the ability of law to adapt to new and innovative concepts, while remaining true to basic principles.’).
253 Ibid (‘Courts have used the terms “mathematical algorithm,” “mathematical formula,” and “mathematical equation,” to describe types of nonstatutory mathematical subject matter without explaining whether the terms are interchangeable or different. Even assuming the words connote the same concept, there is considerable question as to exactly what the concept encompasses. … This court recently pointed out that any step-by-step process, be it electronic, chemical, or mechanical, involves an “algorithm” in the broad sense of the term. … Because § 101 includes processes as a category of patentable subject matter, the judicially-defined proscription against patenting of a “mathematical algorithm,” to the extent such a proscription still exists, is narrowly limited to mathematical algorithms in the abstract.’).
Plager J then cited *State Street* as authority for the proposition that the ‘useful, concrete, and tangible result’ applies to both machines and methods. In doing so, he extended the reach of the ‘useful, concrete, and tangible result’ test to cover process, as well as machine claims.

His Honour held that the claims at issue are clearly patentable subject matter as a process. He was of the opinion that the mathematical algorithm inherent in the process had been reduced to some practical application rendering it ‘useful’. The specification made clear that the use of the process claimed was limited to a specific instance, rather than being an ‘attempt to forestall its use in any other application.’ Since AT&T claimed a process that produced ‘a number which had a specific meaning,’ it could be employed in a discrete setting and was ‘a useful, concrete, and tangible result without pre-empting other uses of the mathematical principle’.

Plager J concluded that a physical transformation is not required to make a claim involving an algorithm patent eligible, but is merely one example of how a mathematical algorithm could be used in a process that brings about a useful application.

The notion of “physical transformation” can be misunderstood. In the first place, it is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application. As the Supreme Court itself noted, “when [a claimed invention] is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.” The “e.g.” signal denotes an example, not an exclusive requirement.

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256 Ibid citing *In re Alappat*, 33 F 3d 1526, 1543 (Fed. Cir. 1994) (’The State Street formulation, that a mathematical algorithm may be an integral part of patentable subject matter such as a machine or process if the claimed invention as a whole is applied in a ‘useful’ manner, follows the approach taken by this Court en banc in In re Alappat.’); Ibid citing *In re Alappat*, 33 F 3d 1526, 1581 (Fed. Cir. 1994) (’we consider the scope of § 101 to be the same regardless of the form - machine or process - in which a particular claim is drafted.’).

257 Ibid 1358.

258 Ibid 1357-1358 (Fed. Cir. 1999) quoting *Diamond v Diehr*, 450 US 175, 192 (1981). Interestingly, Plager J reached the opposite conclusion five years earlier when he authored the majority opinion in
Thus, his Honour interpreted the Supreme Court precedents as holding that a physical transformation is merely an indication that a process is useful and not abstract, and that usefulness, and therefore subject matter eligibility, can be shown even in its absence. His Honour then rejected the suggestion that since AT&T’s claims did not recite a physical transformation, they were not patentable subject matter.\textsuperscript{259}

Finally, his Honour noted that the Federal Circuit had only addressed the subject of patent eligibility, and that, ‘the ultimate validity of these claims depends upon their satisfying the other requirements for patentability such as those set forth in 35 U.S.C. Sections 102, 103, and 112. Thus, on remand, those questions, as well as any others the parties may properly raise, remain for disposition.’\textsuperscript{260} On remand the District Court of Delaware indeed held the patent to be invalid under § 102 due to anticipation.\textsuperscript{261}

\textbf{G The Impact of State Street and AT&T v Excel}

The Federal Circuit opened the floodgates to automated business methods with the \textit{State Street} and \textit{AT&T v Excel} decisions. There was a jump in the number of business method applications filed in the United States after the \textit{State Street} decision as applications for Class 705 (business method patents) increased from fewer than 1,000

\textsuperscript{259}Ibid 1357-1358 quoting \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc.}, 149 F.3d 1368, 1373 (Fed. Cir. 1998). In doing so, Plager J concluded that the analysis in \textit{In re Schrader} 22 F.3d 290 (Fed. Cir. 1994) and \textit{In re Grams}, 888 F.2d 835 (Fed. Cir. 1989) is now ‘unhelpful’ in light of the \textit{State Street} analysis. Further, at 1359, he described the transformation that occurred earlier in \textit{Arrhythmia} as merely confirming that the process had been applied to produce a useful result, in that case a number with a specific meaning.

\textsuperscript{260}Ibid 1361.

\textsuperscript{261}AT&T Corp. v Excel Communications, 52 USPQ 2d 1865 (D. Del. 1999).
applications in 1997 to more than 11,000 applications in 2007.\textsuperscript{262} The decisions signalled the possibility and competitive importance of obtaining business method patents, particularly those in the banking, insurance and finance industries. Previously companies such as these had typically relied upon trade secret protection for their methods of doing business or did not focus on the intellectual property aspects of their businesses at all. After the \textit{State Street} and \textit{AT&T v Excel} decisions, they rushed to patent their business methods as a means of ensuring their freedom to operate or procuring royalty streams, while the public complained about what it perceived as an abuse of the patent system.\textsuperscript{263}

The \textit{State Street} decision marked a seismic shift in the uses to which the patent system has been put. For that it has been criticised. The main criticism of \textit{State Street} and \textit{AT&T v Excel} has been that they allow for too wide a scope of patent eligible subject matter, by extending patent protection to new technologies such as computer software, information processing advances, and business methods.\textsuperscript{264} In response to the decision, one Federal Circuit judge remarked, ‘virtually anything is patentable.’\textsuperscript{265} Arguably, though, \textit{State Street} does not so much represent a change in the law, but an opening of our eyes to what the existing law actually allows.\textsuperscript{266}


\textsuperscript{265} Hughes Aircraft Co. v United States, 148 F.3d 1385, 1385 (Fed. Cir. 1998) (Clevenger, J., dissenting) citing \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc.}, 149 F.3d 1368 (Fed. Cir. 1998).

\textsuperscript{266} cf Dreyfuss, ‘Are Business Method Patents Bad for Business?’, above n 264, 266 who describes these as changes to the law.
Physical Effect in Patent Law

It has been said that the ‘useful, concrete and tangible result’ test is inconsistent with the existing Supreme Court precedent.\(^{267}\) It has been argued that the Federal Circuit confused the state of the law.\(^{268}\) Certainly, the expression, ‘useful, concrete and tangible result’ provides very few clues as to how to engage the difficult task of differentiating abstract from non-abstract ideas and identifying when a fundamental principle has been sufficiently reduced to practical application. Some have said that the ‘useful, concrete and tangible result’ test is meaningless, or adds nothing to the utility requirement already found in § 101.\(^{269}\) Others have sought to explain what each of the terms in the phrase mean. Others have argued that the invention in *State Street* was not novel or non-obvious.\(^{270}\) It has been argued that there are significant, even word-for-word, similarities between the claims in the Signature patent and sections of the Internal Revenue Code.\(^{271}\) Finally, there are the arguments that the court’s characterisation of the patented invention as generating a ‘final share price’ are inaccurate.\(^{272}\)

While it is the case that the expression ‘useful, concrete and tangible result’ is the Federal Circuit’s creation and not wording the Supreme Court has ever embraced, the test as applied in *State Street* and *AT&T v Excel* is not inconsistent with Supreme Court precedent. As explained above, the words, ‘useful’, ‘concrete’ and ‘tangible’ are not individual requirements for patent eligibility. Rather, the test is an admittedly

\(^{267}\) *Laboratory Corporation of America Holdings v Metabolite Laboratories, Inc.*, 126 S. Ct. 2921, 2928 (2006) (Breyer J)(dissent) (‘But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.’); Cynthia M Ho, ‘Lessons from *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc*’ (2007) 23 *Santa Clara Computer & High Tech Law Journal* 463, 470.


\(^{271}\) Stern, ‘Scope-of-Protection Problems’, above n 270, 141-142 (‘the accused infringer may argue that it would be obvious to a person of ordinary skill, if confronted with the applicable provisions of the tax laws… and desiring to computerize compliance with those laws for a pooled fund partnership, to write a program falling within the language of claim 1.’); Thomas, ‘Liberal Professions’, above n 12, 1165.

\(^{272}\) Thomas, ‘Liberal Professions’, above n 12, 1158.
confusing shorthand expression designed to label to the subject matter inquiry set out in *Diamond v Diehr*.

The importance of *State Street* lies in the rejection of the business method exception, the refusal to exclude mathematical algorithms as a class, and most importantly, the demonstration of how the Supreme Court precedent in *Diamond v Diehr* is to be applied. *State Street* did much to clarify the ambiguity surrounding the patentability of algorithms that arose as a result of *Gottschalk v Benson*. It also clarified that contrary to traditional expectations, physicality is not relevant to the subject matter inquiry. After *Alappat*, *State Street* and *AT&T v Excel*, it became clear that inputting numbers, performing data manipulation on numbers, storing numbers and outputting numbers, is statutory subject matter provided the end result is useful.

Without wishing to hold words he drafted early in his career against him, it is curious that Judge Rich, one of the drafters of the 1952 Patent Act as well as a CCPA and Federal Circuit judge of long tenure and the author responsible for laying the business methods exception to rest, in an article in 1960 gave a much narrower view of patent eligibility.

Of course, not every kind of an invention can be patented. Invaluable though it may be to individuals, the public, and national defense, the invention of a more effective organization of the materials in, and the techniques of teaching a course in physics, chemistry, or Russian is not a patentable invention because it is outside of the enumerated categories… Also outside that group is one of the greatest inventions of our time, the diaper service.

The movement away from institutional acceptance of the Federal Circuit’s ‘useful, concrete and tangible result’ test started when the United States Patent and Trademark Office (‘USPTO’) began rejecting applications for pure business methods on the grounds that they do not fall within the ‘technological arts,’ possibly in

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273 See above Part IV.E.
274 In re Alappat, 33 F.3d 1526, 1544 (Fed Cir 1994); *State Street Bank & Trust Co. v Signature Financial Group, Inc.*, 149 F.3d 1368, 1374 (Fed. Cir. 1998); *AT&T Corp v Excel Communications, Inc.*, 172 F.3d 1352, 1359 (Fed. Cir. 1999).
response to the public outcry and criticism of business method patents issued after State Street and AT&T v Excel.276 Rejections of that ilk came before the USPTO Board of Patent Appeals and Interferences (‘BPAI’) in Ex parte Lundgren277 and Ex parte Bilski.278 Both Ex Parte Lundgren and Ex Parte Bilski involved patents being sought in respect of non-machine implemented processes that do not effect a physical transformation of subject matter. The arguments raised in these decisions reflect the lingering uncertainty as to whether non-physical products and processes are patent eligible and what role physicality plays in the test for patent eligibility, despite the guidance of State Street.

H The Supreme Court Almost Weighs in: Laboratory Corp v Metabolite

The case of Laboratory Corp. of America Holdings v Metabolite Laboratories, Inc. (‘LabCorp’),279 offered hope of a Supreme Court opinion to clarify some of the uncertainty surrounding the scope of patentable subject matter that had surfaced in the years following the State Street decision. The Supreme Court initially granted certiorari to consider whether a method of medical diagnosis could be patentable subject matter. However, for reasons unknown, the court revoked the grant and dismissed the writ on the grounds that it had been ‘improvidently granted.’280 Breyer J, who was joined by Stevens and Souter JJ, gave a dissenting opinion to the dismissal of the writ. The dissent directly challenged the standard of patentable subject matter created by the Federal Circuit, arguing that the Supreme Court should have taken the matter on appeal and overruled the State Street decision. Even though it is of no precedential value, the dissent is useful as it provides an indication of the views of some Supreme Court judges.

277 76 USPQ 2d 1385 (Board of Patent Appeals and Interferences 2005) (precedential).
279 Labor Corp. of America Holdings v Metabolite Laboratories, Inc. 126 S.Ct. 2921 (2006).
280 Ibid 2921. The court offered no reasons for dismissing the writ. Breyer J, who was joined by Stevens and Souter JJ, gave a dissenting opinion. Previously, the USPTO had granted the patent and the Federal Circuit had upheld that grant: Metabolite Labs Inc. v Laboratory Corp. of America Holdings, 370 F.3d 1354, 1358 (Fed. Cir. 2004).
The relevant facts are that during the 1980s, three university doctors, conducting research into vitamin deficiencies, made two important discoveries. First, they discovered a new and more accurate ‘panel test’ that used mass spectrometry to measure the amount of total homocysteine\(^{281}\) that exists in human blood. Second, they observed an inverse correlation between the concentration of homocysteine and two B vitamins: cobalamin and folate. They observed that samples with an elevated level of homocysteine were likely to have a B vitamin deficiency and samples with an unelevated level of homocysteine were likely not to have a B vitamin deficiency.

The researchers filed a patent application that was eventually issued (the ‘658 patent’).\(^{282}\) The ‘658 patent contains two distinct types of method claims that protect each of these discoveries. Claim 1 describes a method of assaying to test the concentration of homocysteine in human blood (the ‘panel test’). Claim 13 describes a method of detecting a vitamin B deficiency based on the use of a method of assaying to test the concentration of homocysteine in human blood and the discovery of the inverse correlation between homocysteine and vitamin B. Claim 13 reads as follows.

13. A method for detecting a deficiency of cobalamin or folate in warm-blooded animals comprising the steps of: assaying a body fluid for an elevated level of total homocysteine; and correlating an elevated level of total homocysteine in said body fluid with a deficiency of cobalamin or folate.

The scope of the assaying step in claim 13 extends beyond the use of the panel test disclosed in claim 1. Claim 13 will be infringed by using any method of testing for homocysteine, whether it be the method disclosed in claim 1 or any other method.

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\(^{281}\) Homocysteine is a chemical compound with the formula HSCH\(_2\)CH\(_2\)CH(NH\(_2\))CO\(_2\)H. As a consequence of the biochemical reactions in which homocysteine is involved, deficiencies of the vitamins folic acid (B9), pyridoxine (B6), or B12 (cyanocobalamin) can lead to high homocysteine levels.

The method may be proprietary or in the public domain. It may be obvious or even be one conceived of after the patent application was filed.\textsuperscript{283} The second step in claim 13 covers thinking about the implications of the results of the homocysteine test to reach a conclusion about the existence of a vitamin B deficiency. If the patient’s level of homocysteine is elevated, the diagnosis is a vitamin B deficiency. If the patient’s homocysteine level is normal, the diagnosis is that there is no vitamin B deficiency. Breyer J described the claims at issue.

This case involves a patent that claims a process for helping to diagnose deficiencies of two vitamins, folate and cobalamin. The process consists of using any test (whether patented or unpatented) to measure the level in a body fluid of an amino acid called homocysteine and then noticing whether its level is elevated above the norm; if so, a vitamin deficiency is likely.\textsuperscript{284}

Metabolite Laboratories, Inc. (‘Metabolite’) filed suit against Laboratory Corp. of America Holdings (‘LabCorp’) for contributory patent infringement because it sold a test to doctors that allegedly used the patented method without authorisation. For a number of years, LabCorp had sublicensed the right to perform the panel test from Metabolite, the exclusive licensee of the ‘658 patent, but LabCorp eventually switched from the panel test to a newly developed test devised by Abbott Laboratories (the ‘Abbott test’), and stopped paying royalties to Metabolite for homocysteine assays. In response, Metabolite sued, alleging that LabCorp was infringing claim 13, but not claim 1, of its patented process. Metabolite alleged that the doctors who ordered the homocysteine blood work from LabCorp were the direct infringers of the patent. These doctors ordered and paid for the assay and then mentally diagnosed their patients by performing the correlating step. Metabolite alleged that LabCorp was liable for the doctors’ direct infringements because it aided and abetted the doctors by offering the homocysteine-testing service as a means of diagnosing vitamin B deficiencies.

\textsuperscript{283} Laboratory Corp. of America Holdings v Metabolite Laboratories, Inc. 126 S Ct 2921, 2924 (2006).
\textsuperscript{284} Ibid 2921.
Breyer J dissented from the dismissal of the writ arguing the court should have decided the case because claim 13 was so unpatentable that it did not present even ‘a case at the boundary’ of patentability under the ‘law of nature’ doctrine. Breyer J would have denied the patent’s validity on the grounds that it is an unpatentable natural phenomenon.

There can be little doubt that the correlation between homocysteine and vitamin deficiency set forth in claim 13 is a “natural phenomenon.”

At most, respondents have simply described the natural law at issue in the abstract patent language of a “process.” But they cannot avoid the fact that the process is no more than an instruction to read some numbers in light of medical knowledge.

In other words, the claim could not be described as a process to disguise the fact that the respondent had claimed only a pre-existing naturally occurring relationship. Claim 13 preempts all homocysteine testing performed for the diagnosis of vitamin B12 and folate deficiencies by any known or future-developed methods, purely by pre-empting knowledge of a natural phenomenon.

In relation to physicality, Breyer J noted that the claim did not involve any physical transformation of matter, and did not offer an opinion as to whether processes require a physical transformation to be patentable.

Breyer J expressed doubt that the State Street test is consistent with existing Supreme Court precedent. Instead, Breyer J observed that the relevant test is to ask whether

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285 Ibid 2927.
286 Ibid 2927.
287 Ibid 2928.
289 Laboratory Corp. of America Holdings v Metabolite Laboratories, Inc. 126 S Ct 2921, 2927 (2006).
290 Ibid 2928 (‘But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.’). Breyer J cited O’Reilly v Morse, Parker v Flook and Gottschalk v Benson as examples of cases in which the court invalidated claims
the claim covers a law of nature, natural phenomena or abstract ideas, which are all excluded as a matter of principle. 291 He also recognised the ‘mental processes’ exclusion referred to in Gottschalk v Benson and Parker v Flook, but impliedly rejected in Diamond v Diehr and Diamond v Chakrabarty. 292 He decided that the claim would wholly pre-empt the natural phenomena, being the inverse correlation, that had been observed by the researchers and its practical effect would be a patent of the natural phenomena itself. 293

Breyer J expressed the view that the Supreme Court should have heard the matter to give an authoritative answer to ‘those who engage in medical research, who practice medicine, and who as patients depend upon proper health care.’ 294 However, Laboratory Corp is neither a case whose ramifications are limited to the field of medical diagnostic technology nor an anomalous case, but one with ramifications in all fields of technology. 295

While he agrees with Breyer J, Collins offers a different conceptual framework for the debate over the patentability of claim 13 in LabCorp. Collins has argued that the claim is problematic because it propertises thought. He says that ‘claims propertize thought when they recite acts of thinking about the inventive information that is revealed to the public in the disclosure of a patent.’ 296 According to Collins, thought-propertising claims are problematic because they concern the coexistence of the exclusive private right to exploit the patent, which vests in the patentee, and the obligation to disclose the invention to the public, which creates privileges of access for the public to understand the technology of the invention. The argument is that a member of the public has a legal privilege to think about the idea that animates the

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293 Ibid 2928.
294 Ibid 2922.
296 Ibid 317.
patented invention and to communicate that understanding of the invention to others.²⁹⁷

The argument that a claim propertises thought is directly relevant to the patentability or otherwise of purely intangible inventions, since a claim that propertises thought is necessarily going to be one that involves an alleged invention that does not involve any physical effect or physical transformation of matter.²⁹⁸

Perhaps fearing the unknown consequences of allowing patents over the wave of new information economy inventions it could sense approaching, after Labcorp the Federal Circuit sought to rein in the very liberal view regarding the issue of physicality that it had established in the Alappat, State Street and AT&T v Excel decisions in favour of a physicality requirement in Comiskey and Nuijten.

I Comiskey

The applicant in Comiskey²⁹⁹ claimed a process of resolving a legal dispute between two parties affecting wills and contracts by an allegedly novel way of a human arbitrator using a form of mandatory arbitration. This is both a business method and a legal method useful in resolving legal problems. The method does not merely involve

²⁹⁷ Ibid; Allen Newell, ‘Response: The Models Are Broken! The Models Are Broken!’ (1986) 47 University of Pittsburgh Law Review 1023, 1025 states that the prospect that one may infringe a patent merely by thinking is ‘untenable’.
²⁹⁸ Ibid 320 (‘The invention’s only embodiment in the spatial world of extension occurs, for a materialist, in our gray matter or, for an idealist, in our disembodied minds. If the claim is valid, the patentee’s rights to exclude transgress the intuitive boundary that distinguishes the claimable and propertizable embodiments of an invention from the freely available inventive information itself. In other words, if it is valid, claim 13 propertizes thought.’).
²⁹⁹ 554 F.3d 967 (Fed. Cir. 2009). The case was heard before Michel CJ, Dyk and Prost JJ. Dyk J delivered the court’s unanimous opinion. This is a revised opinion issued by the court. The decision was originally reported at 499 F.3d 1365 (Fed. Cir. 2007) on 20 September 2007. On 13 January 2009, acting en banc, the court vacated the judgment, withdrew the panel’s original opinion and reassigned the opinion to the panel for revision: see In re Comiskey, US App. LEXIS 400 (2009). The court revised its opinion in order to remove ‘misunderstood’ wording within the original opinion linking §§ 101 (subject matter) and 103 (nonobviousness). The original opinion implicitly held that any portion of an invention that would constitute nonstatutory subject matter would be considered de facto obvious. Moore, Newman and Rader JJ dissented from the en banc order, arguing that the court’s original decision should stand.
procedural steps, but also requires the exercise of human intelligence and decision making.\textsuperscript{300}

In denying Comiskey’s claims, the court interpreted the Supreme Court’s precedents as mandating a physicality requirement.

In \textit{Diehr}, the Supreme Court confirmed that a process claim reciting an algorithm could state statutory subject matter if it: (1) is tied to a machine or (2) creates or involves a composition of matter or manufacture.\textsuperscript{301}

The court was of the view that the physicality requirement is a tie between the process category and the other § 101 categories. It held that a claim that involves both a mental process and one of the other categories of statutory subject matter (a machine, manufacture, or composition of matter) may be patentable under § 101.\textsuperscript{302}

\textsuperscript{300} Ibid 969-971 citing United States Patent Application No. 09/461,742 (filed Dec. 16, 1999); Comiskey’s independent claims 1 and 32 claim the mental process itself and independent claims 17 and 46 are system claims are linked to some physical device and apply ‘wherein access to the mandatory arbitration is established through the Internet, intranet, World Wide Web, software applications, telephone, television, cable, video [or radio], magnetic, electronic communication, or other communications means.’ According to the court (at 970), Claim 1 states in full: A method for mandatory arbitration resolution regarding one or more unilateral documents comprising the steps of: enrolling a person and one or more unilateral documents associated with the person in a mandatory arbitration system at a time prior to or as of the time of creation of or execution of the one or more unilateral documents; incorporating arbitration language, that is specific to the enrolled person, in the previously enrolled unilateral document wherein the arbitration language provides that any contested issue related to the unilateral document must be presented to the mandatory arbitration system, in which the person and the one or more unilateral documents are enrolled, for binding arbitration wherein the contested issue comprises one or more of a challenge to the documents, interpretation of the documents, interpretation or application of terms of the documents and execution of the documents or terms of the documents; requiring a complainant to submit a request for arbitration resolution to the mandatory arbitration system wherein the request is directed to the contested issue related to the unilateral document containing the arbitration language; conducting arbitration resolution for the contested issue related to the unilateral document in response to the request for arbitration resolution; providing support to the arbitration resolution; and determining an award or a decision for the contested issue related to the unilateral document in accordance with the incorporated arbitration language, wherein the award or the decision is final and binding with respect to the complainant.

\textsuperscript{301} Ibid 978 citing \textit{Diamond v Diehr}, 450 US 175, 184 (1981) (‘[t]ransformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.’ quoting \textit{Gottschalk v Benson}, 409 US 63, 70 (1972) and \textit{In re Schrader}, 22 F.3d 290, 295 (Fed. Cir. 1994) (holding when a claim does not invoke a machine, ‘§ 101 requires some kind of transformation or reduction of subject matter.’)).

\textsuperscript{302} Ibid 978-979.
The court considered this physical tie to the other § 101 categories to be the factor that distinguishes patentable subject matter from abstract ideas.

The Supreme Court has reviewed process patents reciting algorithms or abstract concepts in claims directed to industrial processes. In that context, the Supreme Court has held that a claim reciting an algorithm or abstract idea can state statutory subject matter only if, as employed in the process, it is embodied in, operates on, transforms, or otherwise involves another class of statutory subject matter, i.e., a machine, manufacture, or composition of matter.303

The court took objection to the fact that the application claimed what is essentially an application of human intelligence. Citing the Gottschalk v Benson prohibition on patenting purely ‘mental processes’, it was of the view that, ‘mental processes--or processes of human thinking--standing alone are not patentable even if they have practical application.’304

The court asserted that a ‘mental process standing alone and untied to another category of statutory subject matter even when a practical application was claimed’ would not be patentable.305 In doing so, the court rejected the notion that merely reciting a practical application of an abstract idea would render it patent eligible.306

In other words, the patent statute does not allow patents on particular systems that depend for their operation on human intelligence alone, a field of endeavor that both the framers and Congress intended to be beyond the reach of patentable subject matter. Thus, it is established that the application of human intelligence to the solution of practical problems is not in and of itself patentable.307

303 Ibid 978.
304 Ibid 979 citing Gottschalk v Benson, 409 US 63, 67 (1972). Interestingly, the Federal Circuit made no mention of the dissent of Breyer J in Labcorp when it addressed this issue.
305 Ibid 980.
306 This finding sent an early signal that the continuing applicability of the State Street ‘useful, concrete and tangible result’ test was under threat.
307 In re Comiskey, 554 F.3d 967, 980 (Fed. Cir. 2009).
Likening them to those considered in *Schrader*, the court found Comiskey’s claims to not be proper subject matter for a patent, because they merely claim an unpatentable mental process.\(^{308}\)

### J Nuijten

The issue before the Federal Circuit in *Nuijten*\(^{309}\) was whether a watermarked signal encoded in a particular manner is patentable subject matter. The three judges hearing the case, by a 2-1 majority, held that it is not.\(^{310}\)

Nuijten’s patent application discloses a technique for reducing the distortion induced by the introduction of ‘watermarks’ into signals. In signals processing, watermarking is a technique by which an original signal is manipulated to embed within it additional data, which can be used to identify the source of the signal. Adding watermarks to computer files discourages unlawful copying and distribution, say of audio and video files. However, watermarking introduces some level of distortion to the signal. The additional data embedded is preferably imperceptible to someone who views or listens to the signal. A listener who plays back a watermarked digital audio file would, if the watermark is sufficiently unobtrusive, not be able to distinguish between the watermarked and unwatermarked versions. However, an analysis of the file by software capable of detecting the watermark will reveal the watermark and its contents. Nuijten’s technique improves existing watermark technology by further modifying the watermarked signal in a way that partially compensates for distortion introduced by the watermark.\(^{311}\)

Nuijten made four independent claims, three of which were allowed. Claims to the process he invented, a device that performs that process and a storage medium holding the resulting signals were allowed. The rejected independent claim and its

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\(^{308}\) Ibid 980, 981 citing *In re Schrader*, 22 F.3d 290, 291 (Fed. Cir. 1994).

\(^{309}\) 500 F 3d 1346 (Fed Cir, 2007). The matter was heard before Gajarsa, Linn and Moore JJ. Gajarsa J wrote on behalf of the majority, which he formed with Moore J. Linn J delivered a dissenting opinion. The appeal was brought in relation to findings of invalidity of some claims in US Patent Application No 09-211, 928. The real party at interest in *Nuijten* is the Philips Corporation. The opinion was handed down on the same day as the original decision in *In re Comiskey*, 499 F 3d 1365 (Fed Cir, 2007): 20 September 2007.

\(^{310}\) Ibid 1348 (affirming the decision of the BPAI).

\(^{311}\) Ibid 1348-1349 (Gajarsa J).
dependent claims the subject of Nuijten’s appeal are claims over the resulting encoded signals themselves. These claims cover transitory electrical and electromagnetic signals propagating through some medium, such as wires, air, or a vacuum, encoded in a particular manner described in the earlier claims that had been allowed.312

Claim 14 of Nuijten’s application is the only independent claim of the four that was rejected by the PTO. It reads as follows.

A signal with embedded supplemental data, the signal being encoded in accordance with a given encoding process and selected samples of the signal representing the supplemental data, and at least one of the samples preceding the selected samples is different from the sample corresponding to the given encoding process.313

1 The Majority in Nuijten

Gajarsa J, writing on behalf of the majority, found that the signals claimed are not encompassed within any of the four enumerated § 101 statutory categories,314 each of which he addressed in turn.

Before dealing with the four § 101 statutory categories, the judge addressed the physicality issue. He examined the issue of claim construction, which he described as turning on a ‘somewhat esoteric and metaphysical point, namely: are the claims at issue limited to covering only physical instances of signals, or do they also cover intangible, immaterial strings of abstract numbers?’315 In resolving the construction of claim 14, the judge noted that a signal implies signalling, meaning the conveyance

312 Ibid 1351. Claim 1, which was allowed by the PTO, recites a ‘method of embedding supplemental data in a signal’ comprising a sequence of specified steps. Claims 11-13, which were allowed by the PTO, are directed to ‘[a]n arrangement for embedding supplemental data in a signal,’ including ‘encoder means for encoding the signal’ and other structural features that carry out the process. Claim 15, also allowed by the PTO, is directed to a storage medium with the encoding properties described above having a signal with embedded supplemental data stored on it.
313 Ibid 1351. Claims 22, 23, and 24 depend on Claim 14, respectively adding requirements that the embedded data be a watermark, that the signal be a video signal, and that the signal be an audio signal.
314 Ibid 1352.
315 Ibid 1353.
of information. To convey information to a recipient, a physical carrier, such as an electromagnetic wave, is needed. Thus, in order to be a ‘signal,’ as required by claim 14, some physical carrier upon which the information is embedded is required.

He next noted that while the claims are limited so as to require some physical carrier of information, they do not in any way specify what carrier element is to be used. Claim 14 only addresses the signal’s informational content; it does not limit the claim to any specified physical medium, nor do the dependent claims add any physical limitations. The judge’s conclusion was that any tangible means of information carriage would suffice for all of the claims at issue.

Nuijten’s claims can of course be embodied by conventional, known means, such as electrical signals, modulated electromagnetic waves, and pulses in fiber optic cable. So long as some object or transmission carries the information specified by Nuijten’s claim, it falls within that claim’s scope regardless of its physical form. In summary, some physical form for the signal is required, but any form will do, so long as a recipient can understand the message—the nature of the signal’s physical carrier is totally irrelevant to the claims at issue.316

The fact that the nature of the signal’s physical carrier is totally irrelevant to the claims at issue was significant for the judge. Purportedly taking a textual approach to the interpretation of the Patent Act, the judge addressed each of the § 101 categories in turn.

Citing Gottschalk v Benson, he construed the term, ‘process’ to require an act, or a series of acts, that transform physical subject matter into a different state or thing.317 This he distinguished from product claims. His Honour held that as a signal is not a series of acts, it is therefore not a process.318

316 Ibid 1353.
317 Ibid 1355 citing Gottschalk v Benson, 409 US 63, 70 (1972) (which in turn quoted Cochrane v Deener, 94 US 780, 788 (1876)) (‘A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing’) (emphasis in original).
318 Ibid.
The judge next considered whether the signal is a ‘machine’. He noted that the Supreme Court has defined a ‘machine’ as ‘a concrete thing, consisting of parts, or of certain devices and combination of devices’ and said that this includes ‘every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result.’ This is a clear statement to the effect that a machine is something that has a physical embodiment. Gajarsa J held that under this definition, a signal is not a machine because it is not comprised of ‘parts’ or devices in a ‘mechanical sense.’ He of course acknowledged that an apparatus that generates the signal is a machine.

While noting that the signals claimed ‘are man-made, in the sense of having been encoded, generated, and transmitted by artificial means’, his Honour considered that ‘artificiality is insufficient by itself to render something a “manufacture.”’ Instead, he noted that the Supreme Court has defined ‘manufacture’ (in its verb form) as ‘the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery.’ He considered that the term ‘manufacture’ (as a noun) refers to ‘tangible articles or commodities’ ‘resulting from the process of manufacture’ meaning ‘articles’ made by man that have a physical embodiment.

Applying that definition to Nuijten’s alleged invention, Gajarsa J held that, a ‘transient electric or electromagnetic transmission does not fit within’ the definition of ‘manufacture’ because something of a transient nature cannot be a ‘tangible article or commodity.’ Instead, it would appear his Honour considered that to be a ‘tangible article or commodity’ requires a degree of permanence that one finds in physical articles produced by manufacturing processes carried out using machines or other devices.

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321 Ibid 1355-1356.
322 Ibid 1356 n 4.
324 Ibid.
325 Ibid 1356-1357.
326 Ibid.
While such a transmission is man-made and physical—it exists in the real world and has tangible causes and effects—it is a change in electric potential that, to be perceived, must be measured at a certain point in space and time by equipment capable of detecting and interpreting the signal. In essence, energy embodying the claimed signal is fleeting and is devoid of any semblance of permanence during transmission. Moreover, any tangibility arguably attributed to a signal is embodied in the principle that it is perceptible—e.g., changes in electrical potential can be measured. All signals within the scope of the claim do not themselves comprise some tangible article or commodity.

Further, Gajarsa J held that a signal cannot be a ‘tangible article or commodity’ when encoded on an electromagnetic carrier and transmitted through a vacuum, because a vacuum is a medium that by definition is devoid of matter. Therefore, in addition to the finding that the signal claimed is not patentable because it lacks permanence, the court also found that the signal is not patentable because the broad wording of the claim (which placed no physical limits on what was claimed) covered at least one non-physical form.

Nuijten did not assert that the signal is a composition of matter. For that reason, his signal was not considered as such.

2 The Dissent of Circuit Linn J in Nuijten

Linn J, in dissent, disagreed with the majority’s view that the term ‘manufacture’ is limited to ‘non-transitory, tangible things’ and that the claims in question are not

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327 Ibid 1356-1357 (citations omitted).
328 Ibid 1357.
329 Ibid citing Diamond v Chakrabarty, 447 US 303, 308 (1980). The judge noted that the Supreme Court in Diamond v Chakrabarty had defined ‘composition of matter’ to mean ‘all compositions of two or more substances and all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids.’
330 Ibid 1358.
directed to statutory subject matter, arguing that the majority’s holding is unsupported by the authority it cites.\textsuperscript{331}

Linn J gave a more expansive view of statutory subject matter and the Supreme Court’s precedent in \emph{Diamond v Chakrabarty} and held the signals in question to be patentable as a ‘manufacture’.\textsuperscript{332} Like Gajarsa J on behalf of the majority, he observed that the Supreme Court in \emph{Diamond v Chakrabarty} defined ‘manufacture’ (in its verb form) as ‘the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery.’\textsuperscript{333} However, he disagreed that ‘this definition limits the term “manufacture” to non-transitory, tangible things’,\textsuperscript{334} instead arguing that ‘[t]he raw “materials” that take new form to become “manufactures” need not be tangible or permanent inputs.’\textsuperscript{335} His Honour used a fairly open definition of ‘material’ to mean ‘that which composes or makes a part of anything’\textsuperscript{336} and ‘manufacture’ to mean ‘[a]ny thing made by art’.
\textsuperscript{337} He found that the definition of ‘article’ ‘provides no indication that the substance must last any longer than is necessary to be useful.’\textsuperscript{338} He thus found that the ‘raw “materials” that take new form to become “manufactures” need not be tangible or permanent inputs.’\textsuperscript{339}

In reaching his conclusion, Linn J rightfully rejected any suggestion that a signal might be an unpatentable ‘abstract idea’.\textsuperscript{340} Linn J focussed on the § 101 requirements that statutory subject matter be both ‘new’ and ‘useful’, which he saw

\begin{footnotesize}
\begin{enumerate}
\item Ib\textsuperscript{d} 1359. Linn J did however, agree with the majority that the signals claimed are not a ‘machine’, ‘process’ or ‘composition of matter’.\textsuperscript{332}
\item Ib\textsuperscript{d}.
\item Ib\textsuperscript{d} 1358 citing \emph{Diamond v Chakrabarty}, 447 US 303, 308 (1980) quoting \emph{American Fruit Growers, Inc. v Brogdex Co.}, 283 US 1, 11 (1931).
\item Ib\textsuperscript{d} citing \emph{Diamond v Chakrabarty}, 447 US 303, 308 (1980), which in turn quoted \emph{American Fruit Growers, Inc. v Brogdex Co.}, 283 US 1, 11 (1931) (‘Because the patent claim at issue contemplates “some physical carrier of information,” the claim requires that some input “material”—whether a pulse of energy or a stone tablet—has been given a “new form[],” “qualit[y],” or “propert[y]” by direct human action or by a machine. The resulting signal is thus a “manufacture” in the “expansive” sense of § 101.’).
\item Ib\textsuperscript{d} 1359.
\item Ib\textsuperscript{d} 1359 citing II.2, \textit{5 Century Dictionary} 3657.
\item Ib\textsuperscript{d} 1361 citing Samuel Johnson, \textit{A Dictionary of the English Language} (3rd ed. 1768).
\item Ib\textsuperscript{d} 1359.
\item Ib\textsuperscript{d} 1359. Linn J also ‘question[ed] whether this case can be decided by reference to a dictionary definition of “manufacture.”’: Ib\textsuperscript{d} 1361.
\item Ib\textsuperscript{d} 1358-1359 (‘it is my view that the claim at issue is both “new” and “useful” and is not an abstract idea.’).
\end{enumerate}
\end{footnotesize}
as limits on the four statutory categories that otherwise encompass ‘anything under the sun that is made by man.’ 341

Linn J distinguished the § 101 requirement that an invention be ‘new’ and the § 102 novelty requirement, explaining that § 101 newness separates inventions from the discovery of a pre-existing principle, while novelty concerns what is disclosed in the prior art. He explained that a scientific truth simply reveals a relationship that has always existed and thus is not ‘new’ in the § 101 sense, even if it may be novel in the sense of being previously undiscovered by man. 342 He said that an invention will be ‘useful’ if it confers a ‘specific and substantial utility’. 343 He noted that the ‘useful’ requirement distinguishes statutory subject matter from the recognised categories of excluded matter when he said:

a patent claim directed to a law of nature, a physical phenomenon, or an abstract idea will ordinarily have practical applications that are too attenuated from the subject of the claim to be “useful.” 344

Linn J therefore framed § 101 as being an inquiry into whether the invention falls within one of the four categories of subject matter, whether it is ‘new and useful’, and whether it falls within one of the categories of excluded matter. 345 He concluded that the signal claimed is ‘new’ because it is man-made, artificial in character, and not ‘natural or pre-existing.’ 346 He held that, although the claimed signal requires encoding using transformations that apply laws of mathematics and physics, it recites a practical application and does not pre-empt any law of mathematics or physics. Moreover, the signal is ‘useful’ in ‘a direct and specific way’ because the invention ‘is directed to encoding and communicating data, and that is precisely what the signal

343 Ibid 1365.
344 Ibid (‘Although mathematical algorithms and similarly abstract principles may be useful (in the casual sense of the term) in a wide variety of contexts, their utility is too far removed from what is claimed for them to be “useful” under § 101.’)
345 Ibid.
346 Ibid 1368.
Accordingly, Linn J concluded that the claimed signal is patent eligible subject matter as it ‘is directed to a new and useful manufacture.’

Linn J clearly thought that there was necessarily a physical aspect to the signal claim before him. He indicated that a signal, which is something that may involve no physical embodiment, must created or read by some sort of apparatus that does have a physical embodiment.

However, he expressly gave no opinion as to whether an invention would be patentable as a ‘process’ without having some discernible effect upon the world or effecting some physical transformation, nor did he given an opinion as to whether the ‘useful’ requirement means that there is a ‘technological’ requirement. It would appear however, that while he was careful not to decide these questions, that Linn J was not in favour of imposing a physicality requirement, which he seems to see as an unnecessary consideration in determining patentability under § 101. So much is evident from his reading of Diamond v Chakrabarty and the following statement.

As a matter of principle, there is little reason to allow patent claims to otherwise unpatentable, deemed abstractions just because those deemed abstractions are stored in a tangible medium, while rejecting the same inventions standing alone. Nuijten’s signal involves the same degree and type of human ingenuity whether or not it happens to be encoded in the magnetic fields of a hard disk drive, the optical pits of a compact disc, a stream of photons propagating across a vacuum, or any other specific form that

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347 Ibid.
348 Ibid 1367.
349 Ibid 1358 (‘I am pleased to join Part II.A of the majority opinion because I agree that a “signal,” as used in the claims at issue, refers to something with a “physical form.”’); 1358: (‘Because the patent claim at issue contemplates “some physical carrier of information,” the claim requires that some input “material”—whether a pulse of energy or a stone tablet—has been given a “new form,” “qualify[ing]” or “properti[ed]” by direct human action or by a machine.’); 1368: (‘No matter what form the signal of claim 14 may take, it must involve “some physical carrier of information” that is created or manipulated through human activity, and that physical carrier must function “to convey information to a recipient”—it must signal.’); 1368: (‘Moreover—though my analysis does not rely on this fact—the claim construction that we unanimously adopt today requires that the signal have a physical manifestation that is directly linked to its purpose. Whether a smoke signal, a sound, or a set of encoded and perhaps encrypted bits traveling across a wireless network in the form of radio waves, a signal must be detectable in order to successfully signal anything.’) (citations omitted).
350 Ibid 1367 n 7 citing In re Comiskey, 499 F.3d 1365 (Fed Cir 2007) and Ex Parte Bilski, Appeal No 2002-2257 (Board of Patent Appeals and Interferences 2006) (non-precedential).
technology might put it in. The signal is either a “new and useful”
manufacture or it is not. To allow a patent on a storage medium containing the
signal but to deny one to the real underlying invention “make[s] the
determination of patentable subject matter depend simply on the draftman’s
[sic] art” in the sense criticized by the Supreme Court in *Flook*.351

That Linn J is opposed to a physicality requirement is also evident from what he said
in a footnote.

Our statement that an invention is patentable subject matter when it
“produce[s] a useful, concrete, and tangible result,” see *In re Alappat*, 33 F.3d
1526, 1544 (Fed. Cir. 1994) (en banc) (emphasis added), does not impose a
requirement that a patentable manufacture must be a tangible thing. Rather,
the fact that an invention gives rise to some tangible result is one indication
that it is not an unpatentable abstract idea.352

Linn J sought to show that the decision in the Morse telegraph case, *O’Reilly v
Morse*, 353 supports his view.354 In *O’Reilly v Morse* the Supreme Court approved
Samuel Morse’s claims to ‘the system of signs, consisting of dots and spaces, and of
dots, spaces, and horizontal lines, for numerals, letters, words, or sentences,
substantially as herein set forth and illustrated, for telegraphic purposes’ (Morse
code) ‘for a process of using electromagnetism to produce distinguishable signs for
telegraphy’ to be patentable as an ‘art’.355 Morse’s claim 5 is a process claim covering
the method (or ‘art’) of signalling. The analogous claims in Nuijten’s patent
application are those that cover the process of generating signals rather than the
signals themselves.356 It is erroneous to suggest, as Linn J has done, that the fact the
Supreme Court allowed Morse’s claim 5 to the ‘art’ of signalling supports the view
that Nuijten’s signals are a ‘manufacture’, as these are different categories of subject
matter. Instead, Linn J’s views in this regard support the argument that he is not in
favour of a physicality requirement. However, it is difficult to reconcile this assertion

352 Ibid 1359.
353 56 US (15 How.) 62 (1854).
354 *In re Nuijten*, 500 F.3d 1346, 1368-1369 (Fed. Cir. 2007).
355 *O’Reilly v Morse*, 56 US (15 How.) 62, 86, 94-95, 111 (1854).
356 *In re Nuijten*, 500 F.3d 1346, 1357 n 9 (Fed. Cir. 2007).
with the fact that Linn J sided with the majority in *Bilski*, which asserted the existence of a physicality requirement.\(^{357}\)

3 Comment

The opinions that held sway in *Comiskey* and *Nuijten* are clearly a divergence from the more liberal view the Federal Circuit took in it earlier decisions in *Alappat*, *State Street* and *AT&T v Excel*.

According to the majority opinion in *Nuijten*, for a signal to be a ‘manufacture’, some physical form of the signal is required, although any form will suffice.\(^{358}\) This requirement is arbitrary and surely ties the patent system to outdated technologies at the expense of modern innovations. Furthermore, it disregards the nature of the invention. The invention is a signal that contains an embedded watermark that does not perceptibly distort the signal. The utility of the invention is obvious. The invention is directed to encoding and communicating data. The signal is an improved means of carrying information, where any information that it carries is distinct from the invention itself. It is difficult to see why the existence of a physical manifestation is relevant. As Linn J said in dissent:

> Nuijten’s signal involves the same degree and type of human ingenuity whether or not it happens to be encoded in the magnetic fields of a hard disk drive, the optical pits of a compact disc, a stream of photons propagating across a vacuum, or any other specific form that technology might put it in. The signal is either a “new and useful” manufacture or it is not.\(^{359}\)

In addition, it is difficult to see the relevance of the invention being ‘transient’ or ‘fleeting’, when instances of the signal as claimed will have a degree of permanence, a fleeting or transient signal may be all that is necessary to achieve a useful result and when an encoded signal as claimed can be generated time and time again. Further, the

\(^{357}\) *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (*en banc*). One possible explanation is that he felt bound to follow the precedent in *Comiskey*.

\(^{358}\) *In re Nuijten*, 500 F.3d 1346, 1360 (Fed. Cir. 2007) (‘And as the majority holds, the claim makes no assumptions about what physical form the signal might take. The claim therefore encompasses embodiments, such as inscriptions on paper, in which the signal itself may last indefinitely.’).

inconsistent nature of the majority’s decision is highlighted by the different treatment it would afford to signals per se and signals encoded in a physical medium.\(^{360}\)

Had claim 14 or its dependent claims been limited to any specified physical medium, then the majority would have allowed them. However, as the application was so broadly worded to be without limitation, it decided that the claim fell outside the scope of patentable subject matter. The difficulty with majority’s insistence on a physicality requirement is that it ignores the useful result the signal claimed is capable of providing and ignores the potential impact the recognition of ‘new and useful’ signals would otherwise have on innovation in the field of information technology and communications. Arguably, Nuijten’s claim 14 is not directed to an abstract mathematical or scientific principle, and ought to have been recognised as being patent eligible on the basis of it being a new and useful artificial ‘manufacture’ not previously founding nature and made by a human.\(^{361}\)

It is curious that a different result was reached in the English case of *Re an Application for a Patent by Henry Barnato Rantzen (Rantzen’s Application)*.\(^{362}\) In *Rantzen’s Application*, Evershed J considered an application for a patent for a method of electrical transmission. The process solely affected electrical oscillations, which were defined in the evidence as ‘the manner in which electrical energy exists when being transmitted either by means of wire or other conducting media or through space’. The method was held to be a ‘manufacture’, by interpreting the expression ‘vendible product’ in a sense wide enough to include electrical energy, despite its non-material character and because of its analogy, in commercial respects, with material commodities.\(^{363}\) Evershed J’s view is clearly consistent with the more liberal approach taken by Linn J.

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360 Ibid 1359 (Linn J).
361 This is the result Linn J reached in dissent: ibid 1367.
363 The High Court of Australia in the NRDC decision also recognised that the concept of patentability needs to be wide enough to encompass previous decisions such as *The Electric Telegraph Co v Brett* (1851) 10 CB 838 (138 ER 331), cited in *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 272, which regarded as patentable a method of giving duplicate electric signals.
Another curious aspect of *Nuijten* is that although he found that the watermarked signal did not fall within any of the four statutory categories of subject matter, Gajarsa J did not find that the signal fell within any of the recognised categories of excluded matter. Thus, the *Nuijten* majority seeks to rupture the pairing of statutory subject matter and the recognised categories of excluded matter, which arguably displays the error in Gajarsa J’s reasoning.

Linn J’s approach is preferable to that taken by Gajarsa J on behalf of the majority. While Linn J appears not to endorse a physicality requirement, although he expressly declined to give a view on this point, it is difficult to reconcile this assertion with the fact that Linn J joined the majority in *Bilski*, which asserted the existence of a physicality requirement.  

The Federal Circuit decided not to hold an *en banc* hearing of the *Nuijten* appeal. Three judges, including Linn J of the original panel, dissented from the *en banc* denial. These are the reasons given by those dissenting judges, which succinctly demonstrate the errors of the majority.

As I explained in my dissent from the panel opinion in this case, our decision conflicts with our own precedents as well as those of the Supreme Court. See *In re Nuijten*, 500 F.3d 1346, 1358 (Fed. Cir. 2007) (Linn, J., concurring-in-part and dissenting-in-part). It conflicts with our own precedent because our predecessor court’s decision in *In re Breslow*, 616 F.2d 516 (C.C.P.A. 1980), forecloses the majority’s conclusion, see *Nuijten*, 500 F.3d at 1356, that something “transient” or “fleeting” cannot constitute a “manufacture” under 35 U.S.C. § 101. And it conflicts with Supreme Court precedent because it ignores the Supreme Court’s analysis of how, in general terms, § 101 is to be construed. As the Court discussed in *Diamond v Chakrabarty*, patentable subject matter includes “anything under the sun that is made by man” except for certain enumerated exceptions: “The laws of nature, physical phenomena,

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364 *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (*en banc*). One possible explanation is that he felt bound to follow the precedent in *Comiskey*.

365 *In re Nuijten*, 515 F.3d 1361 (Fed. Cir. 2008).

366 Michel CJ, Mayer, Lourie, Schall, Bryson, Gajarsa, Dyk, Prost, and Moore JJ. constituted the majority, while Linn J filed a dissenting opinion, in which Newman and Rader JJ joined.
and abstract ideas have been held not patentable.” 447 U.S. 303, 309, 100 S. Ct. 2204, 65 L. Ed. 2d 144 (1980). The majority’s narrow construction of “manufacture” ignores this framework.

In addition, this case raises important questions about the relationship between § 101 and § 103. In this case, we affirm the PTO’s rejection of claims to a signal simpliciter, but the PTO has allowed a claim to a storage medium containing the very same signal, on the grounds that the storage medium is a manufacture that can be rejected, if at all, only under some provision other than § 101. In particular, the PTO considers the patentability of such claims under the “printed matter” doctrine of § 103. See In re Lowry, 32 F.3d 1579 (Fed. Cir. 1994). These distinctions make no practical sense and are poorly supported by precedent, which, to the contrary, requires a more holistic approach to the question of whether a claim is directed only to an unpatentable abstraction or whether it is directed to a patentable application of such an abstraction to an otherwise statutory invention. Cf. Parker v. Flook, 437 U.S. 584, 591, 98 S. Ct. 2522, 57 L. Ed. 2d 451 (1978) (“The process itself, not merely the mathematical algorithm, must be new and useful.”); cf. also In re Abele, 684 F.2d 902, 909 (C.C.P.A. 1982) (“As was the case in [Diamond v.] Diehr[, 450 U.S. 175, 101 S. Ct. 1048, 67 L. Ed. 2d 155 (1981).] ... the algorithm is but a part of the overall claimed process.”). The distinctions that are drawn between signals and storage media containing those signals would appear to apply equally to the distinctions between software and hardware and are artificial at best.367

Nuijten’s petition to the Supreme Court for certiorari in a case captioned Nuijten v Dudas was denied.368

K In re Bilski

In a much anticipated decision, the Federal Circuit in *Bilski*[^369] sought to clarify the standards applicable in determining whether a purely non-physical method constitutes patent eligible subject matter. It did so by introducing a physicality requirement it called the ‘machine-or-transformation test.’[^370] In so holding, the Federal Circuit overruled its earlier *State Street* decision to the extent that it deemed its own ‘useful, tangible and concrete result’ test to be an ‘inadequate’ proxy test under which to determine whether an alleged invention recites patent eligible subject matter.[^371]

1 **Overview of the Decision**

Bernard L Bilski and Rand A Warsaw (‘Bilski’) lodged a patent application claiming a method for managing (or hedging) the consumption risks associated with selling a commodity at a fixed price for a given period. The method can be used for energy commodities, such as natural gas, electricity, and coal. It is of utility due to its ability to compensate for the risk of consumption fluctuations caused by abnormal weather conditions, such as unusually cold winters (which require more heating) or unusually hot summers (which require more cooling). The key element of the alleged invention is the ability to sell the commodity at a fixed price based on historical averages.[^372]

The claimed method involves: (a) initiating a series of transactions between a commodity provider and consumers, who purchase the commodity at a fixed price based upon historical averages; (b) identifying market participants interested in the commodity that have a counter-risk position to the consumers; and (c) initiating a


[^370]: Ibid 954.


series of transactions between the commodity provider and market participants at a second fixed price to balance the risk position of the commodity provider.\textsuperscript{373}

This is clearly not the sort of invention that has been traditionally recognised as patentable subject matter. It is not tied expressly or impliedly to any physical subject matter, tangible or intangible. It describes a non-machine-implemented method that is not tied to any particular form of technology. It does not recite how the steps of the method are implemented and is broad enough to cover performing the steps without any machine or apparatus. No tangible device or computer hardware is required to perform the method, although performing the steps on a machine would infringe the claims. It does not involve a transformation of physical subject matter or any electrical, chemical, or mechanical act. The method could be performed entirely by a human being without use of any physical apparatus. It does not directly transform data by a mathematical or non-mathematical algorithm. Lastly, it does not involve making or using a machine, manufacture, or composition of matter.

\textsuperscript{373} Ibid; \textit{In re Bilski}, 545 F.3d 943, 949-950 (Fed. Cir. 2008). The patent application contains eleven claims. The court focused on the first of Bilski’s claims, treating it as being representative of all the claims made in the application. Claim 1 reads:

A method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of:
(a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer;
(b) identifying market participants for said commodity having a counter-risk position to said consumers; and
(c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions.

In order to explain the nature of the invention claimed, the court gave the following an example of a method of hedging commodities trading risk. [C]oal power plants (i.e., the “consumers”) purchase coal to produce electricity and are averse to the risk of a spike in demand for coal since such a spike would increase the price and their costs. Conversely, coal mining companies (i.e., the “market participants”) are averse to the risk of a sudden drop in demand for coal since such a drop would reduce their sales and depress prices. The claimed method envisions an intermediary, the “commodity provider,” that sells coal to the power plants at a fixed price, thus isolating the power plants from the possibility of a spike in demand increasing the price of coal above the fixed price. The same provider buys coal from mining companies at a second fixed price, thereby isolating the mining companies from the possibility that a drop in demand would lower prices below that fixed price. And the provider has thus hedged its risk; if demand and prices skyrocket, it has sold coal at a disadvantageous price but has bought coal at an advantageous price, and vice versa if demand and prices fall. Importantly, however, the claim is not limited to transactions involving actual commodities, and the application discloses that the recited transactions may simply involve options, i.e., rights to purchase or sell the commodity at a particular price within a particular timeframe.
The Federal Circuit affirmed the finding of the BPAI below that Bilski’s claimed invention does not satisfy the patentable subject matter requirements of 35 USC § 101 on the grounds that the claim does not satisfy the machine-or-transformation test. The majority saw the issue before it being whether the applicants’ claims recite a fundamental abstract principle, and if so, whether the application would substantially pre-empt all uses of that fundamental principle if allowed.\(^{374}\) If so, the claims would not be patent eligible subject matter.\(^{375}\)

The approach the majority took to resolve the issue was to apply existing Supreme Court precedent. It did not attempt a policy-based analysis, seemingly on the belief that policy issues lie within the domain of the legislature and have already been resolved by the wording of the legislation as interpreted by that Supreme Court precedent. The majority did not undertake an historical analysis, although, Dyk J (who was supported by Linn J) did seek to remedy this in his concurring supplementary opinion by attempting to demonstrate that Bilski’s claims are not consistent with the types of claims historically recognised by the patent system.\(^{376}\)

2. *The Machine-or-Transformation Test*

The majority interpreted the existing Supreme Court precedent as laying down a definitive test to determine whether a process claim encompasses only a particular application of a fundamental principle, which is patent eligible, rather than pre-empting the principle itself, which is strictly unpatentable. According to the majority, a process is surely patent eligible under § 101 if:

(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing.\(^{377}\)

Thus, the court was of the opinion that it is embodiment in a particular machine or apparatus, or physical transformation of subject matter that distinguishes fundamental

\(^{374}\) The court seemed to equate the term, ‘fundamental principle’, with the recognised categories of excluded matter.  
\(^{375}\) *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008) (*en banc*).  
\(^{376}\) Ibid 966-976.  
\(^{377}\) Ibid 954.
principles in the abstract from patent eligible subject matter. The court called this the ‘machine-or-transformation test.’ It held that this is the sole test for determining the subject matter eligibility of a claimed process.

Confusingly, though, while it regarded the machine-or-transformation test as the ‘sole’ test for subject matter eligibility, the court also thought that the test could be displaced in appropriate circumstances, should it, or the Supreme Court think it appropriate to do so.

Nevertheless, we agree that future developments in technology and the sciences may present difficult challenges to the machine-or-transformation test, just as the widespread use of computers and the advent of the Internet has begun to challenge it in the past decade. Thus, we recognize that the Supreme Court may ultimately decide to alter or perhaps even set aside this test to accommodate emerging technologies. And we certainly do not rule out the possibility that this court may in the future refine or augment the test or how it is applied. At present, however, and certainly for the present case, we see no need for such a departure and reaffirm that the machine-or-transformation test, properly applied, is the governing test for determining patent eligibility of a process under § 101.

In effect, the court is saying that the machine-or-transformation test is the sole test for now. In reality, it would appear that the test is in fact that: a claimed process must either be tied to a machine or apparatus or transform a particular article into a different state or thing, unless it is a process without physical constraints that is

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378 Ibid (‘The Supreme Court, however, has enunciated a definitive test to determine whether a process claim is tailored narrowly enough to encompass only a particular application of a fundamental principle rather than to pre-empt the principle itself.’).
379 Ibid 956. The Federal Circuit in Bilski confirmed that the test applied in Comiskey was an application of the machine-or-transformation test: In re Bilski, 545 F.3d 943, 960 (Fed. Cir. 2008) (‘And we actually applied the machine-or-transformation test to determine whether various claims at issue were drawn to patent-eligible subject matter.’) citing In re Comiskey, 554 F.3d 967, 980 (Fed. Cir. 2009); In re Bilski, 545 F.3d 943, 960 n 24 (Fed. Cir. 2008) (‘Our statement in Comiskey that “a claim reciting an algorithm or abstract idea can state statutory subject matter only if, as employed in the process, it is embodied in, operates on, transforms, or otherwise involves another class of statutory subject matter, i.e., a machine, manufacture, or composition of matter,” was simply a summarization of the Supreme Court’s machine-or-transformation test and should not be understood as altering that test.”’) (citations omitted).
380 Ibid.
381 Ibid.
otherwise a permissible practical application of a principle or idea and does not pre-empt a fundamental principle of nature or abstract idea. In this sense, the court is hedging its bets, given that it is possible that some future unforeseen technology might arise and expose the machine-or-transformation test as being inadequate.\(^{382}\)

The court was aware of what it described as corollaries of the Supreme Court’s decisions in *Parker v Flook* and *Diamond v Diehr* that mere field-of-use limitations are generally insufficient to render an otherwise ineligible process claim patent eligible and that ‘insignificant post-solution activity will not transform an unpatentable principle into a patentable process.’\(^{383}\) It acknowledged that these limitations would be read in conjunction with the machine-or-transformation test.

In contrast, a claim that is tied to a particular machine or brings about a particular transformation of a particular article does not pre-empt all uses of a fundamental principle in any field but rather is limited to a particular use, a specific application. Therefore, it is not drawn to the principle in the abstract… [and that] even if a claim recites a specific machine or a particular transformation of a specific article, the recited machine or transformation must not constitute mere ‘insignificant post solution activity.’\(^{384}\)

3  *The Court Rejected the ‘Useful, Concrete, and Tangible Result’ Test*

In *Bilski*, the Federal Circuit did an ‘about face,’ overturning its finding in *State Street* that the test for patent eligibility is that an invention must produce a ‘useful, concrete and tangible result.’\(^{385}\) It found the *State Street* formula ‘insufficient to determine whether a claim is patent eligible under § 101.‘\(^{386}\) The Federal Circuit contended that the ‘useful, concrete and tangible result’ was a proxy test that ‘was

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\(^{382}\) This is consistent with the view of Stern, ‘Being Within the Useful Arts’, above n 11, 8, who has suggested that it would be better to adopt a presumption, rather than an absolute rule that non-physical processes are patent-ineligible, and that such a view is consistent with the existing Supreme Court precedent.


\(^{384}\) *In re Bilski*, 545 F.3d 943, 957 (Fed. Cir. 2008).

\(^{385}\) *State Street Bank & Trust Co. v Signature Financial Group, Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1998) (endorsed in *AT&T Corp. v Excel Communications, Inc.*, 172 F.3d 1352, 1360 (Fed. Cir. 1999)).

\(^{386}\) *In re Bilski*, 545 F.3d 943, 959 (Fed. Cir. 2008). From the oral hearings in the appeal, the court seemed to admit that it did not understand its own ‘useful, concrete, and tangible result’ test.
certainly never intended to supplant the Supreme Court’s test’ for determining patent eligibility.\textsuperscript{387}

Arguably, the Federal Circuit misunderstood Rich J’s intentions that the ‘useful, concrete and tangible result’ expression was not intended as a proxy test, but merely a label to indicate that the focus of the Supreme Court’s existing patentable subject matter inquiry is on whether the claimed invention produces a useful result, rather than being an abstract idea or principle.\textsuperscript{388}

4 \textit{The Court Rejected the Adoption of a ‘Technological Arts’ Test}

The court rejected the adoption of a ‘technological arts’ test on the basis that such a test could not be clearly defined.

We perceive that the contours of such a test, however, would be unclear because the meanings of the terms “technological arts” and “technology” are both ambiguous and ever-changing. And no such test has ever been explicitly adopted by the Supreme Court, this court, or our predecessor court, as the Board correctly observed here. Therefore, we decline to do so and continue to rely on the machine-or-transformation test as articulated by the Supreme Court.\textsuperscript{389}

The court considered that the machine-or-transformation test does not amount to a ‘technological arts’ test.\textsuperscript{390}

5 \textit{There Are No Category-Based Exclusions}

The court rejected calls for categorical exclusions beyond those already identified by the Supreme Court. On this basis the court affirmed its decision to refuse to recognise a business method exception in \textit{State Street}.\textsuperscript{391}

\textsuperscript{387} Ibid.
\textsuperscript{388} See discussion regarding the use of the ‘useful, concrete, and tangible result’ label, above Part IV.E.
\textsuperscript{389} \textit{In re Bilski}, 545 F.3d 943, 960 (Fed. Cir. 2008).
\textsuperscript{390} Ibid 964.
We rejected just such an exclusion in *State Street*, noting that the so-called “business method exception” was unlawful and that business method claims (and indeed all process claims) are “subject to the same legal requirements for patentability as applied to any other process or method.” We reaffirm this conclusion.391

The Court also declined to adopt a broad exclusion over software or any other such category of subject matter beyond the exclusion of claims drawn to fundamental principles set forth by the Supreme Court.392

6 ‘Physical Steps’ Alone Are Not Sufficient

The majority clarified that its machine-or-transformation test is not a requirement that a process disclose ‘physical steps’. A claim that recites physical steps but neither recites a particular machine or apparatus, nor transforms an article into a different state or thing, is not patent eligible. As such, it held that a process in which every step can be performed entirely in the human mind would not be patentable, nor would a process that only dictates the organisation of or interactions between humans.393

7 What Type of Machine or Physical Transformation is Required?

The court explained that the machine-or-transformation test requires that ‘the use of a specific machine or transformation of an article must impose meaningful limits on the claim’s scope to impart patent-eligibility’394 and ‘the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity.’395

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392 Ibid 960 n 23.
393 *In re Bilski*, 545 F.3d 943, 961 (Fed. Cir. 2008) citing *AT&T Corp. v Excel Communications, Inc.*, 172 F.3d 1352, 1359 (Fed. Cir. 1999). The court claimed to have criticised using a ‘physical steps’ test in *AT&T Corp., Inc. v Excel Communications, Inc.*
However, the court did not explain what type of machine or physical transformation is required, nor did it explain what a ‘particular machine’ is. A significant question that remains is whether a general purpose computer will qualify as a particular machine.396

We leave to future cases the elaboration of the precise contours of machine implementation, as well as the answers to particular questions, such as whether or when recitation of a computer suffices to tie a process claim to a particular machine.397

In relation to the requirement that a process must transform an article into a different state or thing, the court did not give much detail that would explain what sorts of ‘transformations’ or ‘articles’ will satisfy its test, other than to say ‘transformation must be central to the purpose of the claimed process.’398

The court did say that such transformations clearly include chemically and mechanically induced processes that physically transform tangible matter.399 The Supreme Court in Gottschalk v Benson had previously given fairly obvious examples of what constitutes a physically transformative process for the sake of the § 101 inquiry. These include: ‘a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device’ and the ‘arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores’;400 ‘a process for manufacturing flour so as to improve its quality’;401 the process of ‘manufacturing fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure’;402 ‘a “process” for expanding metal… [being a] process “involving mechanical operations, and producing a new and useful

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396 As such, there is uncertainty as to how this new test is compatible with In re Alappat, 33 F.3d 1526, 1558 (Fed Cir 1994) (in which a computer software program containing an anti-aliasing algorithm that was used to create a smooth curve on a digital oscilloscope screen rather than a jagged image was held to be patentable subject matter).
397 In re Bilski, 545 F.3d 943, 962 (Fed. Cir. 2008).
398 Ibid.
399 Ibid (‘It is virtually self-evident that a process for a chemical or physical transformation of physical objects or substances is patent-eligible subject matter.’).
401 Ibid citing Cochrane v Deener, 94 US 780 (1876).
402 Ibid 70 citing Tilghman v Proctor, 102 US 707, 721 (1880).
result,” 403 and ‘a process for setting eggs in staged incubation and applying mechanically circulated currents of air to the eggs’. 404 However, it gave little indication as to the extent to which the ‘raw materials of many information-age processes’, such as ‘electronic signals and electronically-manipulated data’ can be patented. 405 What the court did explain was that the types of transformation permitted are those of ‘physical objects or substances’ and those ‘representative of physical objects or substances’ and would include ‘an electronic signal representative of any physical object or substance.’ 406 In particular, the court made clear, referring to In re Abele, that transformation of raw data representing some physical and tangible article into a particular visual depiction on a visual display is sufficient, even though there is no transformation of the physical object the data represents. 407 However, the Federal Circuit was clear in stating that mere data gathering steps would not be sufficient to transform an unpatentable process into patentable subject matter, describing these as insignificant extra-solution activity. 408

Except where there is a transformation of data representative of physical objects, the Federal Circuit’s machine-or-transformation test creates uncertainty as to whether computer software running on a general purpose computer is patentable subject matter. The specific questions the test in its present form leaves unanswered are: whether a computer software program running on a general purpose computer is a particular machine, as required by the first part of the test; and whether a computer software program causes an acceptable physical transformation to the general purpose computer when it is run that constitutes more than mere extra- or post-solution activity, as required by the second part of the test. 409

403 Ibid citing Expanded Metal Co. v Bradford, 214 US 366, 385-386.
405 In re Bilski, 545 F.3d 943, 962 (Fed. Cir. 2008).
406 Ibid 964-965.
408 Ibid 963 citing and referring to In re Grams, 888 F.2d 835 (Fed. Cir. 1989), In re Meyer, 688 F.2d 789 (CCPA 1982) and In re Schrader, 22 F.3d 290 (Fed. Cir. 1994).
409 Prior decisions of the Federal Circuit, and the CCPA, may be of assistance in answering this question. For instance, In re Alappat, 33 F.3d 1526, 1558 (Fed. Cir. 1994) (in which it was recognised that ‘a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software’); In re Bernhart, 417 F.2d 1395 (CCPA 1969); In re Lowry, 32 F.3d 1579 (Fed. Cir. 1994); In re Grams, 888 F.2d 835 (Fed. Cir. 1989); In re Warmerdam, 33 F.3d 1354 (Fed. Cir. 1994).
One aspect of this finding that is difficult to rationalise is why a transformation of raw data representative of physical objects, which does not involve any transformation of the underlying physical objects themselves, would be patent eligible, when a transformation of data not representative of physical objects would not. It is difficult to see why a method of converting data representing a human heart rate into a form that can easily be understood by a human being, say as a line graph, should be treated differently to a similar method of converting data representing price data over time.

8 The Majority’s Rationale for the Machine-or-Transformation Test

The majority’s rationale for the machine-or-transformation test lies in its reading of the existing statutory framework and Supreme Court precedent.\textsuperscript{410} That rationale begins with the Supreme Court’s \textit{Cochrane v Deener} decision, which purportedly placed a limit on the reach of the § 101 process category when it said the following.

\begin{quote}
A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing.\textsuperscript{411}
\end{quote}

The majority claimed that the \textit{Gottschalk v Benson} court adopted the approach taken in \textit{Cochrane v Deener} when it quoted this statement\textsuperscript{412} before holding that transformation is ‘the clue’ to the patentability of a process claim.

\begin{quote}
Transformation and reduction of an article “to a different state or thing” is the clue to the patentability of a process claim that does not include particular machines.\textsuperscript{413}
\end{quote}

\begin{Verbatim}
\textsuperscript{410} In re Bilski, 545 F.3d 943, 952-954 (Fed. Cir. 2008).
\textsuperscript{411} Cochrane v Deener, 94 US 780, 788 (1876).
\textsuperscript{412} In re Bilski, 545 F.3d 943, 955-956 (Fed. Cir. 2008) citing Gottschalk v Benson, 409 US 63, 70 (1972) which in turn quoted Cochrane v Deener, 94 US 780, 788 (1876).
\textsuperscript{413} Ibid citing Gottschalk v Benson, 409 US 63, 70 (1972). Note that the court says that ‘transformation… is the clue,’ not ‘transformation… is a clue.’ (emphasis added). The majority in Bilski was of the opinion that this wording indicates that the machine-or-implementation test is mandatory, not optional or merely advisory. See In re Bilski, 545 F.3d 943, 956 n 11 (Fed. Cir. 2008).
\end{Verbatim}
The majority then focused on one sentence in a footnote in *Parker v Flook*, in which the Supreme Court recognised that:

An argument can be made [that the Supreme] Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a “different state or thing”.414

Finally, the majority pointed to *Diamond v Diehr*, which it claimed applied the machine-or-transformation test to hold that use of a mathematical formula in a process ‘transforming or reducing an article to a different state or thing’ constitutes patent eligible subject matter.415

The majority conceded that it appears the *Benson* court was initially equivocal when putting forward this test, which might have been to suggest that the test was not considered to be the sole yardstick of patentability.

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a “different state or thing.” We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.416

However, it wiped away all concerns that its new machine-or-transformation test might not be the only applicable test by finding that as the Supreme Court in the later decision in *Diamond v Diehr* had not repeated this ‘equivocation’ it did not intend it to have any continuing effect. There the court said only that:

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416 *In re Bilski*, 545 F.3d 943, 956 (Fed. Cir. 2008) citing *Gottschalk v Benson*, 409 US 63, 71 (1972). The Federal Circuit in *Bilski* said that in *Parker v Flook*, 437 US 584, 589 n 9 (1978), the Court took note that this statement had been made in *Benson* but merely stated, ‘As in *Benson*, we assume that a valid process patent may issue even if it does not meet [the machine-or-transformation test].’
Transformation and reduction of an article “to a different state or thing” is the clue to the patentability of a process claim that does not include particular machines.\textsuperscript{417}

The majority also claimed that the Supreme Court’s earlier decisions, \textit{O’Reilly v Morse},\textsuperscript{418} \textit{Cochrane v Deener}, and \textit{Tilghman v Proctor}\textsuperscript{419} are consistent with the machine-or-transformation test.\textsuperscript{420}

\textbf{9 The Court’s Decision: Rejection of Bilski’s Claims}

The Federal Circuit rejected the applicants’ claimed process on the grounds that it does not satisfy the court’s machine-or-transformation test. The court made clear that ‘transforming’ relationships between people would not pass muster.

Purported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the test because they are not physical objects or substances, and they are not representative of physical objects or substances.\textsuperscript{421}

The court categorised these as ‘ineligible transformations.’\textsuperscript{422} The court said that it is not enough to say that a claimed process produces ‘useful, concrete and tangible results’ because as already discussed, this is insufficient to establish patent eligibility under § 101.\textsuperscript{423}

The majority declared that allowing the Bilski claims, ‘would effectively pre-empt any application of the fundamental concept of hedging and mathematical calculations inherent in hedging (not even limited to any particular mathematical formula).’\textsuperscript{424} Therefore, as the claims do not satisfy what the majority declared to be the applicable

\begin{footnotes}
\item[418] 56 US 62 (1854).
\item[419] 102 US 707 (1880).
\item[420] \textit{In re Bilski}, 545 F.3d 943, 955 (Fed. Cir. 2008).
\item[421] Ibid 963.
\item[422] Ibid 964.
\item[423] Ibid.
\item[424] Ibid 965-966.
\end{footnotes}
test to determine whether a claim is drawn to a patent eligible process under § 101 set forth by the Supreme Court, the decision of the BPAI was affirmed and Bilski’s claims were held not to have been directed to statutory subject matter.425

10 Why the Federal Circuit’s Views Are Inconsistent With Established Doctrine: Flaws in the Majority Opinion

The flaws in the majority’s opinion are neatly exposed in Newman J’s dissent. In an opinion reminiscent of her vigorous dissent in Schrader,426 Newman J criticised the majority for creating a test that is not supported by the statutory language of § 101, not consistent with existing Supreme Court precedent, fails to keep up with changes in new technologies, and ties patent eligibility to technologies of a bygone era.

In Newman J’s opinion, the only subject matter excluded from patent eligibility are fundamental principles, laws of nature or abstract ideas,427 a view which precludes the court’s new machine-or-transformation test. In her Honour’s view, neither the text of § 101 nor the Supreme Court’s precedents support the view that a process must transform or reduce an article to a different state or thing. In reaching this conclusion, her Honour opined that the Federal Circuit had earlier applied the binding Supreme Court precedent correctly in its State Street decision.428

She argued that the quote from Cochrane v Deener429 merely illustrates one type of statutory process and that the Supreme Court has been adamant in its decision to not allow the law to freeze process patents to old technologies, in the way mandating a physical transformation would. She claimed that the Supreme Court in Gottschalk v Benson explicitly rejected the argument that a “process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a ‘different state or thing.’” Instead, her opinion is that the Benson court regarded this

425 Ibid 966.
426 22 F.3d 290 (Fed. Cir. 1994).
427 In re Bilski, 545 F.3d 943, 976-977 (Fed. Cir. 2008).
428 Ibid 991-992.
429 Cochrane v Deener, 94 US 780, 788 (1876). See above n 411 and accompanying text.
only as one instance, or an example, of patent eligible subject matter, a position she holds as having been followed in *Parker v Flook* and *Diamond v Diehr*.\(^{430}\)

That Newman J’s view is preferable can be observed from a more complete reading of the Supreme Court precedents the majority pins its reasoning to. Her Honour explained that the Federal Circuit’s restrictive view of ‘processes’ was in fact rejected in *Gottschalk v Benson*.\(^{431}\) Newman J found that the *Benson* court declined to limit patent eligibility to processes that involve a physical transformation when it said the following.

> It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a “different state or thing.” We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.\(^{432}\)

According to Newman J, by saying, ‘[w]e do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents,’ the Supreme Court in *Gottschalk v Benson* recognised that its earlier assertion in *Cochrane v Deener*, that ‘[t]ransformation and reduction of an article “to a different state or thing” is the clue to the patentability of a process claim that does not include particular machines’\(^{433}\) was made in the context of a mechanical process and a past era and should no longer be followed.\(^{434}\) Thus, according to Newman J, the court in *Gottschalk v Benson* made clear that it rejected the argument “that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a ‘different state or thing’” in order to satisfy § 101.\(^{435}\)

Her Honour then pointed to a passage in *Parker v Flook* in which the court clearly indicated that it intended to follow its previous decision in *Gottschalk v Benson*.

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\(^{430}\) *In re Bilski*, 545 F.3d 943, 977-982 (Fed. Cir. 2008).

\(^{431}\) Ibid 978-979.

\(^{432}\) Ibid 978 citing *Gottschalk v Benson*, 409 US 63 (1972).


\(^{434}\) *In re Bilski*, 545 F.3d 943, 979 (Fed. Cir. 2008).

The statutory definition of “process” is broad. An argument can be made, however, that this Court has only recognized a process as within the statutory definition when it either was tied to a particular apparatus or operated to change materials to a “different state or thing.” As in Benson, we assume that a valid process patent may issue even if it does not meet one of these qualifications of our earlier precedents.\textsuperscript{436}

According to her Honour, this statement ‘directly contravenes [the Federal Circuit’s] new requirement that all processes must meet the court’s ‘machine-or-transformation test’ or be barred from access to the patent system.’\textsuperscript{437}

Next, Newman J explained that in Diamond v Chakrabarty, the Supreme Court recognised that Congress’s use of the word, ‘any’ in §101 (‘Whoever invents or discovers any new and useful process...’) reveals that any process is patent eligible, not just those that involve a physical transformation of matter.\textsuperscript{438} Newman J noted that the court identified the legislative intent as being to include within the scope of § 101 ‘anything under the sun that is made by man.’\textsuperscript{439}

Finally, her Honour noted that in Diamond v Diehr the Supreme Court directly held that computer-implemented processes are patentable subject matter. She refuted the majority’s assertion that the Supreme Court in Diamond v Diehr had regarded the machine-or-transformation test as a limit to the scope of § 101 subject matter. Instead she found that the court had only identified one example of circumstances in which an invention will be patent eligible. The essence of the statement made in Gottschalk v Benson which indicated that a process might not require a physical transformation was repeated in Diamond v Diehr.\textsuperscript{440}

\textsuperscript{436} Ibid quoting Parker v Flook, 437 US 584, 589 n.9 (1978) quoting Cochrane v Deener, 94 US 780, 788 (1876).
\textsuperscript{437} Ibid 980.
\textsuperscript{438} Ibid 980-981 citing Diamond v Chakrabarty, 447 US 303, 308 (1980).
\textsuperscript{439} Ibid 980 citing Diamond v Chakrabarty, 447 US 303, 309 (1980) citing S. Rep. 82-1979, at 5; H.R. Rep. 82-1923, 6 (1952). This approach appears to parallel that taken by Linn J in his dissenting opinion in In re Nuijten, 500 F.3d 1346 (Fed. Cir. 2007), however, Linn J sided with the majority in Bilski rather than Newman J.
\textsuperscript{440} Ibid 981-982.
On the other hand, when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.441

Newman J explained this in the following way.

This statement’s parenthetical “e.g.” is relied on by the majority for its statement that Diehr requires today’s “machine-or-transformation” test. However, this “e.g.” does not purport to state the only “function which the patent laws were designed to protect.” This “e.g.” indeed describes the process in Diehr, but it does not exclude all other processes from access to patenting. It cannot be inferred that the Court intended, by this “e.g.” parenthetical, to require the far-reaching exclusions now attributed to it.442

Her Honour pointed out that there was no issue in Diamond v Diehr of the need for either machine or transformation, ‘for both were undisputedly present in the process of curing rubber’,443 therefore any suggestion in Diamond v Diehr that the machine-or-transformation test is mandatory is strictly obiter dicta.

Further, she recognised, contrary to the majority’s finding, that in AT&T v Excel, the Federal Circuit had itself described physical transformation as ‘merely one example of how a mathematical algorithm may bring about a useful application.’444 In a statement that bears repeating, Plager J said:

The notion of “physical transformation” can be misunderstood. In the first place, it is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application. As the Supreme Court itself noted, “when [a claimed invention] is performing a function which the patent laws were designed to protect (e.g., transforming or reducing

442 Ibid (citations omitted).
443 Ibid.
an article to a different state or thing), then the claim satisfies the requirements of § 101."… The “e.g.” signal denotes an example, not an exclusive requirement.\textsuperscript{445}

Newman J also made the case that the earlier Supreme Court decisions, \textit{O’Reilly v Morse},\textsuperscript{446} \textit{Cochrane v Deener}, and \textit{Tilghman v Proctor}\textsuperscript{447} show that a process has never been tied to either apparatus or transformation, as the majority holds.\textsuperscript{448} Citing \textit{In re Prater},\textsuperscript{449} Newman J noted that the Court of Customs and Patent Appeals observed:

\begin{quote}
[This \textit{Cochrane} passage] has sometimes been misconstrued as a “rule” or “definition” requiring that all processes, to be patentable, must operate physically on substances. Such a result misapprehends the nature of the passage quoted as \textit{dictum}, in its context, and the question being discussed by the author of the opinion. To deduce such a rule from the statement would be contrary to its intendment which was not to limit process patentability but to point out that a process is not limited to the means used in performing it.\textsuperscript{450}
\end{quote}

Interestingly, Morse’s valid claim 5, which claimed a ‘system of signs’ is neither ‘tied to a particular machine’ nor transforms anything other than data, so it would fail the Federal Circuit’s machine-or-transformation test. Nonetheless, the Supreme Court held it to be patentable.

In Newman J’s view, the majority has redefined the ‘process’ category in § 101 to exclude all processes that do not transform physical matter or that are not performed by machines, a restriction that did not previously exist and one that is contrary to statute, Supreme Court precedent and the constitutional mandate.\textsuperscript{451} Instead, her Honour proposed that the approach to be taken to identify patentable subject matter is

\begin{footnotesize}
\begin{enumerate}
\item \textit{Biological Tissue Rejuvenation} (Tissue Engineering), 54 F.3d 1390 (Fed. Cir. 1995).
\item \textit{AT&T Corp v Excel Communications, Inc}, 172 F.3d 1352, 1357-1358 (Fed. Cir. 1999).
\item \textit{Diamond v Diehr}, 450 US 175, 192 (1981).
\item \textit{Diamond v Diehr}, 450 US 175, 192 (1981).
\item \textit{In re Bilski}, 545 F.3d 943, 983-985 (Fed. Cir. 2008).
\item \textit{In re Bilski}, 545 F.3d 943, 984 (Fed. Cir. 2008) citing \textit{In re Prater}, 415 F.2d 1393, 1403 (CCPA 1969).
\item \textit{In re Bilski}, 545 F.3d 943, 984 (Fed. Cir. 2008) citing \textit{In re Prater}, 415 F.2d 1393, 1403 (CCPA 1969).
\item \textit{In re Bilski}, 545 F.3d 943, 984 (Fed. Cir. 2008) citing \textit{In re Prater}, 415 F.2d 1393, 1403 (CCPA 1969).
\item \textit{In re Bilski}, 545 F.3d 943, 984 (Fed. Cir. 2008) citing \textit{In re Prater}, 415 F.2d 1393, 1403 (CCPA 1969).
\end{enumerate}
\end{footnotesize}
a simple one. In her view, § 101 is a ‘dynamic provision designed to encompass new and unforeseen inventions,’ that involves recognising that the scope of patentable subject matter is broad and encompasses ‘anything under the sun that is made by man’ other than the recognised exclusions of fundamental principles, laws of nature and abstract ideas.

A straightforward, efficient, and ultimately fair approach to the evaluation of “new and useful” processes—quoting Section 101—is to recognize that a process invention that is not clearly a “fundamental truth, law of nature, or abstract idea” is eligible for examination for patentability.

Newman J criticised the majority’s decision to change the existing law by introducing a new test for determining patent eligibility. Her Honour argued that the United States has benefited from having a stable system of law that values legal certainty and a patent system that has always recognised a broad scope of patentable subject matter, limited only by the patentability requirements that lie outside § 101. She maintained that the dual qualities of legal certainty and broad subject matter are essential to foster innovation, so the Federal Circuit should not change the law without due consideration; and that in any event this is a change that should be left to Congress.

[T]he wider effect will be a disincentive to innovation-based commerce. For inventors, investors, competitors, and the public, the most grievous consequence is the effect on inventions not made or not developed because of uncertainty as to patent protection.

Newman J’s dissenting opinion promotes the merits of a broad approach to subject matter eligibility. This approach would allow any new and useful process, devised by a human, that falls outside the recognised exceptions to be patent eligible and includes innovations that lack any physical embodiment or link with technology. Such an approach would allow patent rewards to encourage intangible, information-
processing inventions in the same way patent rights have previously encouraged tangible inventions.

Newman J was the only judge in *Bilski* who found that the claims recite statutory subject matter. She concluded that Bilski’s claim 1 is neither a fundamental truth nor an abstraction and as such the majority was wrong to deem it patent-ineligible.

Bilski’s patent application describes his process of analyzing the effects of supply and demand on commodity prices and the use of a coupled transaction strategy to hedge against these risks; this is not a fundamental principle or an abstract idea; it is not a mental process or a law of nature. It is a “process,” set out in successive steps, for obtaining and analyzing information and carrying out a series of commercial transactions for the purpose of “managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price.” Claim 1, preamble.

Because the process Bilski describes employs complex mathematical calculations to assess various elements of risk, any practicable embodiment would be conducted with the aid of a machine—a programmed computer—but the court holds that since computer-implementation is not recited in claim 1, for that reason alone the process fails the “machine” part of the court’s machine-or-transformation test. And the court holds that since Bilski’s process involves the processing of data concerning commodity prices and supply and demand and other risk factors, the process fails the “transformation” test because no “physical objects or substances” are transformed. The court then concludes that because Bilski’s Claim 1 fails the machine-or-transformation test it ipso facto preempts a “fundamental principle” and is thereby barred from the patent system under Section 101: an illogical leap that displays the flaws in the court’s analysis.\(^456\)

Instead, her Honour suggested that if a claim is unduly broad, or if it fails to include sufficient specificity, the appropriate ground of rejection is § 112, which requires that

\(^{456}\) Ibid 995-996 (citations omitted).
claims particularly identify and distinctly claim the invention, rather than being outlawed under § 101. 457

11 The Remaining Dissenting Judges

Mayer J argued in favour of a ‘technological arts’ test limited to advances in science and technology and not permitting patents for business methods.

The patent system is intended to protect and promote advances in science and technology, not ideas about how to structure commercial transactions. … Affording patent protection to business methods lacks constitutional and statutory support, serves to hinder rather than promote innovation and usurps that which rightfully belongs in the public domain. 458

Mayer J focused heavily on the policy arguments that lie against allowing patents over business methods to support his holding that Bilski’s claims are not deserving of patent protection. His Honour found Bilski’s claims unpatentable because the innovative aspect is entrepreneurial rather than technological.

Rader J wrote an eloquent repudiation of the majority’s opinion that echoed Newman J’s analysis of the majority’s misreading of the statutory provision and Supreme Court precedent. He asked why the majority’s test is necessary when settled law already provides a framework for determining the patentability of Bilski’s claims.

This court labors page after page, paragraph after paragraph, explanation after explanation to say what could have been said in a single sentence: “Because Bilski claims merely an abstract idea, this court affirms the Board’s rejection.” 459

His Honour roundly criticised the majority for failing to take account of new technology.

457 Ibid 996.
459 Ibid 1011 (Rader J) (dissent).
Much of the court’s difficulty lies in its reliance on dicta taken out of context from numerous Supreme Court opinions dealing with the technology of the past. In other words, as innovators seek the path to the next techno-revolution, this court ties our patent system to dicta from an industrial age decades removed from the bleeding edge.\textsuperscript{460}

Rader J also highlighted the difficult questions that the machine-or-transformation test will create.

Instead this opinion propagates unanswerable questions: What form or amount of “transformation” suffices? When is a “representative” of a physical object sufficiently linked to that object to satisfy the transformation test? (e.g., Does only vital sign data taken directly from a patient qualify, or can population data derived in part from statistics and extrapolation be used?)

What link to a machine is sufficient to invoke the “or machine” prong? Are the “specific” machines of Benson required, or can a general purpose computer qualify? What constitutes “extra-solution activity?” If a process may meet eligibility muster as a “machine,” why does the Act “require” a machine link for a “process” to show eligibility? Does the rule against redundancy itself suggest an inadequacy in this complex spider web of tests supposedly “required” by the language of section 101?\textsuperscript{461}

The simplicity of Rader J’s opinion is appealing and it contains is an admirably concise summation of Supreme Court precedent. In fact, that the question at issue can be addressed so simply is revealing.

However, the opinion contains one major flaw. It fails to explain why Bilski’s claim 1 is an abstract idea. His Honour made an attempt to describe an abstract claim.

Such an abstract claim would appear in a form that is not even susceptible to examination against prior art under the traditional tests for patentability. Thus

\textsuperscript{460}Ibid.
\textsuperscript{461}Ibid 1015 (Rader J) (dissent).
this court would wish to ensure that the claim supplied some concrete, tangible technology for examination.\textsuperscript{462}

His Honour then went on to say:

Indeed the hedging claim at stake in this appeal is a classic example of abstractness. Bilski’s method for hedging risk in commodities trading is either a vague economic concept or obvious on its face.\textsuperscript{463}

However, this is not much of a test. It is as helpful as saying, I know patentable subject matter when it see it.\textsuperscript{464} What it lacks is clear guidance explaining why Bilski’s method is just a vague economic concept. The fact that the method might be obvious is irrelevant to the s 101 inquiry.

The claim the Federal Circuit focussed its attention on, claim 1, is certainly unpatentable as an abstract idea because it does not disclose a specific hedging process. The steps of the claim are not adequately described so as to enable them to be repeated by another. For example, steps (a) and (c) in claim 1, that involve ‘initiating a series of transactions’, cannot reliably be expected to reproduce an identical, or near-identical, result each time the method is executed. Bilski’s claim 1 in this sense is similar to Morse’s unpatentable claim 8. Just as Morse was not entitled to a patent for all forms of communication using electro-magnetism however developed, Bilski is not entitled to broadly patent the idea of hedging in the field of commodities trading, by claiming every method of identifying risk profiles for buyers and sellers of commodities.

Naturally, it is not the case that there are no hedging methods that fall within the scope of patentable subject matter. If Bilski’s claim 1 had disclosed a clearly defined series of steps commodities traders could follow to hedge positions, it might have achieved a practically useful and specific result. A process such as this would not have been excluded from patent eligibility because it would not broadly pre-empt

\begin{flushright}
\textsuperscript{462} Ibid 1013. \\
\textsuperscript{463} Ibid. \\
\textsuperscript{464} Jacobellis v Ohio, 378 US 184, 197 (1964) (When referring to the court’s attempt to identify an obscenity, Stewart J, concurring, said, ‘I know it when I see it’.).
\end{flushright}
other methods of hedging or foreclose innovators from developing alternative or superior hedging processes.\textsuperscript{465}

In addition to subject matter concerns, what must also be considered is whether Bilski’s application is unpatentable because it covers ideas and methods already known or obvious to those practised in the art of hedging. However, these concerns are not relevant to the patentable subject matter issues the Federal Circuit was limited to considering. If they are to be considered, the case will need to be remanded to the USPTO.\textsuperscript{466}

12 The Machine-or-Transformation Test is Arguably Inconsistent With TRIPS

A consequence of introducing the machine-or-transformation test is that the United States is now arguably in breach of its obligations under Article 27.1 of the Agreement on Trade-Related Aspects of Intellectual Property Rights\textsuperscript{467} (‘TRIPS Agreement’). Article 27.1 declares that ‘patents shall be available for any inventions, whether products or processes, in all fields of technology’. As a consequence, it arguably does not permit the exclusion of classes of subject matter, such as non-physical inventions.\textsuperscript{468}

13 Life After Bilski: Where to Next?

\textit{Bilski} leaves unanswered some questions the Federal Circuit hoped to resolve. These include whether a transformation of someone’s spine in a chiropractic treatment is sufficient to attract patent eligibility, whether a sporting manoeuvre, such as the

\textsuperscript{465} Such a patent eligible claim arguably exists in Bilski’s claim 4 and its dependent claims, which appear to provide the necessary level of detail to enable a person skilled in the art to reproduce the specific and practical result claimed. Claim 4 includes a mathematical relationship that is used to determine the fixed price for the consumer transactions in the claimed method.

\textsuperscript{466} \textit{In re Bilski}, 545 F.3d 943 (Fed. Cir. 2008) (\textit{en banc}) (Newman J) (dissent) (‘I don't know whether Bilski can meet these requirements--but neither does this court, for the claims have not been examined for patentability, and no rejections apart from Section 101 are included in this appeal.’).


\textsuperscript{468} See above, Chapter 2 Part II.J. By the same logic, the patentable subject matter test under the European Patent Convention is also inconsistent with the TRIPS Agreement because the inclusion of a list of excluded categories in that convention means that patents in member states of the European Union are not ‘available for any inventions… in all fields of technology’.
action of causing a fumble (in gridiron) or throwing a curveball (in baseball) is sufficient, or whether mere communication of information between people or a change in the relationships between people is a sufficient real world effect (say where a patent application claims a process of using mandatory arbitration to resolve disputes affecting wills and contracts, as was the case in *Comiskey*).469

Unfortunately, the Federal Circuit’s machine-or-transformation test is not the panacea for the problem of patentability of purely intangible inventions that observers were hoping for. Rather, it would appear that Newman J got it right, showing us that the Supreme Court’s approach to applying the excluded categories of subject matter still holds sway.

A straightforward, efficient, and ultimately fair approach to the evaluation of “new and useful” processes—quoting Section 101—is to recognize that a process invention that is not clearly a “fundamental truth, law of nature, or abstract idea” is eligible for examination for patentability.470

As both Newman and Rader JJ made clear, the guidance we have from the Supreme Court is that any process is patentable subject matter provided that it does not claim a fundamental principle, a law of nature or an abstract principle. As such, it would appear that there is no ‘bright line’ test471 dividing patentability and non-patentability. Secondly, there is no convenient proxy test to substitute for the Supreme Court’s pronouncements. We need to accept that because the concept of invention is excitingly unpredictable, it necessarily has fuzzy borders.472

469 On 24 August 2009, the USPTO issued interim examination instructions for evaluating subject matter eligibility after *Bilski*. Those guidelines explicitly provided that simple recitation of a computer to carry out a process will be insufficient if there are no steps that make the computer a special purpose computer and invoke the “meaningful limit” and “insignificant extra-solution activity” corollaries: Interim Examination Instructions for Evaluating Subject Matter Eligibility under 35 U.S.C. § 101 (August 24, 2009) (distributed by Andrew H. Hirshfield, Acting Deputy Commissioner for Patent Examination Policy) <http://www.uspto.gov/web/offices/pac/dapp/opla/2009--08-25_interim_101_instructions.pdf> at 31 November 2009.

470 In re *Bilski*, 545 F.3d 943, 997 (Fed. Cir. 2008).


The Federal Circuit’s machine-or-transformation test is at best useful as a presumptive guide (or clue) to determining the patent eligibility of an alleged invention. Had the majority described its machine-or-transformation test as indicative of patent eligibility, rather than the sole test, its decision would not have been inconsistent with the existing principles to which the court was bound.

Given the errors in the court’s reasoning, it is likely that on appeal, the United States Supreme Court will quash the majority’s reasoning and the machine-or-transformation test and remand the matter to the BPAI.\(^{473}\)

**L  In re Ferguson**

*In re Ferguson*\(^{474}\) (‘Ferguson’) involved method and so-called ‘paradigm’\(^{475}\) claims to a marketing regime, whereby a marketing company obtains the exclusive right to market the products of other companies in exchange for a share of the profits of each of those companies.\(^{476}\) The case is a perfect vehicle for testing the subject matter eligibility of pure business methods bereft of any physical constraints. The claims are solely directed to organising business or legal relationships and are completely non-physical in nature. The claimed subject matter involves human actions, but requires no independent thought or decision-making, or any other exercise of human intelligence.\(^{477}\)

\(^{473}\) Bilski petitioned the United States Supreme Court seeking a writ of certiorari, which was granted: *Bilski v Doll*, No 08-964, 2009 US LEXIS 4103 (Fed Cir, filed 30 January 2009) (granted 1 June 2009, Order List 556).

\(^{474}\) *In re Ferguson*, 558 F.3d 1359 (Fed. Cir. 2009). The case was heard before Newman, Mayer, and Gajarsa JJ. An opinion was filed by Gajarsa J who wrote on behalf of himself and Mayer J. A concurring opinion was filed by Newman J (disputing many of the subject matter grounds relied upon by the majority).

\(^{475}\) It would appear that the applicants chose the term, ‘paradigm’ to represent something that is not a process, machine or a composition of matter.

\(^{476}\) US Patent Application Serial No. 09/387,823 (‘the ‘823 application’).

\(^{477}\) *In re Ferguson*, 558 F.3d 1359, 1361 (Fed. Cir. 2009). Claim 1, which is representative of the applicants’ method claims, describes a pure business method. It reads:

A method of marketing a product, comprising:

- developing a shared marketing force, said shared marketing force including at least marketing channels, which enable marketing a number of related products;
- using said shared marketing force to market a plurality of different products that are made by a plurality of different autonomous producing company, so that different autonomous companies, having different ownerships, respectively produce said related products;
- obtaining a share of total profits from each of said plurality of different autonomous producing companies in return for said using; and
- obtaining an exclusive right to market each of said plurality of products in return for said using.
The court rejected the applicants’ method claims on the basis that they do not cover patent eligible subject matter because they do not meet either prong of the machine-or-transformation test established in *Bilski*. The applicants had asked the court to consider a new test to determine patent eligibility, being: does the claimed subject matter require that the product or process has more than a ‘scintilla of interaction’ with the real world in a specific way? The majority declined to adopt the applicants’ proposed ‘scintilla of interaction’ test on the grounds that in *Bilski* it had clearly stated that ‘the “sole,” “definitive,” “applicable,” “governing,” and “proper” test for a process claim under § 101 is the Supreme Court’s machine-or-transformation test.’

The majority rejected the applicants’ ‘paradigm’ claims on the basis that they are not directed to any of the § 101 categories of patentable subject matter, describing them as being abstract ideas, seemingly because they did not satisfy the machine-or-transformation test.

[T]here is nothing definite or concrete about Ferguson’s marketing paradigm. At most, it is simply composed of “legal obligations, organizational relationships, and business risks,” which this court characterized in *Bilski* as “abstract constructs”.

Newman J in dissent, as she had done in *Bilski*, rejected the validity of the machine-or-transformation test, and argued that the Ferguson method is not an abstract idea because it is ‘definite and concrete and limited.’ She objected to the court defining...

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Claim 24, which is representative of the applicants’ so-called ‘paradigm’ claims, reads:

A paradigm for marketing software, comprising:
- a marketing company that markets software from a plurality of different independent and autonomous software companies, and carries out and pays for operations associated with marketing of software for all of said different independent and autonomous software companies, in return for a contingent share of a total income stream from marketing of the software from all of said software companies, while allowing all of said software companies to retain their autonomy.

478 Ibid 1363-1364 citing *In re Bilski*, 545 F.3d 943, 963 (Fed. Cir. 2008) (‘But as this court stated in *Bilski*, “[p]urported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the test because they are not physical objects or substances, and they are not representative of physical objects or substances.”’).
479 Ibid 1364-1365.
480 Ibid 1365.
481 Ibid 1366 n 6 citing *In re Bilski*, 545 F.3d 943, 962-963 (Fed. Cir. 2008).
482 Ibid 1367.
‘abstract idea’ as anything that does not meet the machine-or-transformation test, rather than seeing an abstract idea as a principle drawn in the abstract that pre-empts all uses rather than being limited to a particular use or specific application.483

Newman J also objected to the machine-or-transformation test on the basis that it would have a chilling effect on the incentive to innovate. She opined that the patent eligibility of emerging non-physical information technologies must be considered in appropriate cases, rather than being broadsided by the restrictive machine-or-transformation test, and that the Federal Circuit had rendered its decision in Bilski in ignorance of the consequences it would bring.484 Her Honour, however, did concur with the majority’s view that the application is unpatentable, but did so on different grounds, those being that the alleged invention does not pass the test of obviousness under § 103.485

M Prometheus v Mayo

In Prometheus v Mayo,486 the Federal Circuit applied the machine-or-transformation test to determine the patent eligibility of methods of providing medical treatment to a human being. The applicant claimed methods of medical treatment that involve calibrating the proper dosage of thiopurine drugs, which are used for treating both gastrointestinal and non-gastrointestinal autoimmune diseases. To that end, the patents claim methods to optimise therapeutic efficacy while minimising toxic side effects. The diagnostic element of the methods involves an iterative testing mechanism in which a drug is injected into a patient and the patient’s metabolic response is measured. Subsequent doses are re-calibrated according to the measured metabolic response.487

483 Ibid.
484 Ibid.
485 Ibid 1368.
487 Ibid 1339. The only issue before the court was whether the claims meet the requirements of § 101. This appeal did not raise any questions about lack of novelty, obviousness, or overbreadth: 1345. According to the court, claim 1 of the ’623 patent is representative of the independent claims asserted by Prometheus in this case:

A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:
The District Court for the Southern District of California below granted a motion for summary judgment of invalidity under § 101. It found that the patents claimed correlations between certain thiopurine drug metabolite levels and therapeutic efficacy and toxicity, rather than an invention. The court reasoned that the claims have three steps: (1) administer the drug to a subject; (2) determine metabolite levels; and (3) be warned that an adjustment in dosage may be required. In doing so, it found that the first two steps are merely necessary data-gathering steps and that the final step is an unpatentable mental step. The court stated that the fact that inventors framed the claims as treatment methods does not make the claims patentable.488

The district court’s error was that it parsed the steps of the treatment method separately. What is should have done was consider the method as a whole, namely, the series of transformative steps that optimises the efficacy and reduces toxicity of a method of treatment of a particular disease using specific drugs.489 While it is true that useful data is gathered during the administering and determining steps, those steps also form part of a transformative treatment protocol.490

The Federal Circuit noted that the Supreme Court has made clear that the patent eligibility of a claim as a whole should not be based on whether selected limitations constitute patent eligible subject matter.491 The Federal Circuit noted that in *Diamond v Diehr*, the Supreme Court has specifically stated that it is ‘inappropriate to dissect
the claims into old and new elements and then to ignore the presence of the old elements in the analysis. ⁴⁹²

Mayo contended that the patents impermissibly claim and wholly pre-empt the use of natural phenomena, specifically, the correlations between thiopurine drug metabolite levels and efficacy and toxicity. ⁴⁹³ In a unanimous opinion, the Federal Circuit rejected Mayo’s patentable subject matter challenge, holding that the claimed methods for calibrating a drug dosage are patent eligible. ⁴⁹⁴ The Federal Circuit concluded that the methods of treatment claimed in the patents in suit ‘squarely fall within the realm of patentable subject matter’ because they satisfy the transformation prong of the machine-or-transformation test. It held that they ‘transform an article into a different state or thing,’ and this transformation is ‘central to the purpose of the claimed process.’ ⁴⁹⁵ The court determined that the disputed claims do not merely claim natural correlations and data-gathering steps. Instead, it recognised the claims as being made in respect of methods of treatment that involve data-gathering steps and reference to natural correlations. ⁴⁹⁶

In doing so, the court noted that administering drug treatment transforms the biochemical makeup of the patient’s body for the purpose of treating disease because ‘drugs do not pass through the body untouched without affecting it.’ ⁴⁹⁷

The transformation is of the human body following administration of a drug and the various chemical and physical changes of the drug’s metabolites that enable their concentrations to be determined. ⁴⁹⁸

The court observed that a physical transformation always occurs when medicines are administered to treat a person, and agreed that physical transformations such as a human body’s metabolic reaction in response to the administration of a drug are not

⁴⁹³ Prometheus v Mayo, 581 F.3d 1336, 1340-1341 (Fed. Cir. 2009).
⁴⁹⁴ Ibid 1339. The court made clear that the dispute focused solely on patentable subject matter issues and not other validity issues such as obviousness or novelty.
⁴⁹⁵ Ibid 1346 citing In re Bilski, 545 F.3d 943, 962 (Fed. Cir. 2008).
⁴⁹⁶ Ibid.
⁴⁹⁷ Ibid.
⁴⁹⁸ Ibid.
ineligible simply because they proceed according to natural laws or occur within the human body.499

In other words, when asked the critical question of “What did the applicant invent?,” the answer is a series of transformative steps that optimizes efficacy and reduces toxicity of a method of treatment for particular diseases using particular drugs.500

Finally, the court rebutted Mayo’s argument that the Prometheus claims wholly pre-empt the use of a natural process.

The claims cover a particular application of natural processes to treat various diseases, but transformative steps utilizing natural processes are not unpatentable subject matter. Moreover, the claims do not preempt natural processes; they utilize them in a series of specific steps.501

The court distinguished the Prometheus claims from diagnostic claims that merely require data gathering and correlation, rather than an introduction of drugs into the body. In doing so, it hinted that the diagnostic claim in LabCorp is not patentable. Although the court noted that the LabCorp dissent is not of precedential value, it found Breyer J’s reasoning persuasive.502 However, the present facts are to be distinguished from those in LabCorp. LabCorp involved testing for an elevated level of homocysteine and correlating an elevated level of homocysteine with a vitamin B deficiency, where any form of test, even one in the public domain, could be used. This really is nothing more than an attempt to claim, and wholly pre-empt, a natural phenomenon, namely the inverse correlation between homocysteine and vitamin B levels within the body. This is different to what was claimed in Prometheus v Mayo, which is a method of treatment that involves a discovery of a natural phenomenon having been reduced to a specific practical application in a treatment method. As such, the Prometheus claims would not prevent someone other than the patentee drawing a conclusion after having observed the metabolite levels.

499 Ibid.
500 Ibid 1349 citing In re Grams, 888 F.2d 835, 839 (Fed. Cir. 1989) (citations omitted).
501 Ibid.
502 Ibid 1346.
The court also distinguished the Prometheus claims from those in *In re Grams* \(^503\) (‘Grams’). In *Grams*, the applicant claimed a diagnostic test procedure that involved: (1) performing a clinical test on individuals; and (2) based on the test result, determining if an abnormality existed and any possible causes of any abnormality by using an algorithm. The court found the process was not drawn to patentable subject matter because the essence of the claimed process was a mathematical algorithm, rather than any transformation taking place within the individuals tested. \(^504\) The *Grams* process was seen in *Bilski* as merely being an algorithm combined with a data-gathering step. \(^505\) Unlike the diagnostic test in *Grams*, the administering and determining steps in Prometheus’s methods are not mere data-gathering steps or insignificant extra-solution activity, but are elements of treatment regimes. \(^506\)

It may trouble some that the Prometheus patents appear to comprise nothing more than a discovery coupled with physically transformative steps that would be obvious to take once the discovery has been made. To many it would surely seem that the obvious use of a discovery should not be patent eligible. The use of ‘obvious’ in this context, does not mean obvious in light of the prior art, but refers to that which is obvious to try once the discovery is made. This concern is starkly brought to the fore because the methods claimed in *Prometheus v Mayo* are quite uncomplicated because they do not involve many steps.

However, a method’s patentability is not determined by the number of steps involved, nor is patentability denied where the reduction to practice might appear obvious once a natural phenomenon has been discovered. Rather, the critical issue is that the inventor must not pre-empt all uses of the phenomenon discovered, or all uses within a field. Alas, it would appear that once a natural phenomenon is discovered, using the principle involved in a series of steps that includes appending seemingly obvious physically transformative steps to that discovery to produce a useful result is all that

\(^503\) 888 F.2d 835 (Fed. Cir. 1989). See *Prometheus v Mayo*, 581 F.3d 1336, 1348 (Fed. Cir. 2009).
\(^504\) Ibid 839-841.
\(^505\) *In re Bilski*, 545 F.3d 943, 963 (Fed. Cir. 2008).
\(^506\) *Prometheus v Mayo*, 581 F.3d 1336, 1348 (Fed. Cir. 2009).
is required to get a patent, assuming that the remaining strictures of patentability are met.\textsuperscript{507}

From \textit{Prometheus v Mayo}, it can be seen that most methods of medical treatment will be drawn to patentable subject matter because that they necessarily cause a biochemical change within the patient’s body. The same can be said for surgical methods, and even non-invasive treatment methods, such as physical therapy (massage) and a psychologist’s treatment of people’s thoughts to affect their behaviours and emotions. Where there is uncertainty is the patentability of clinical tests to detect disease or an abnormality within the body following \textit{Grams} and its treatment in \textit{Prometheus v Mayo}.

\textbf{N Comment: Divergent and Conflicting Views From the Federal Circuit}

Since its formation, the Federal Circuit has sounded a cacophony of opinions on what the patent-eligibility standard involves. Arguably, this is the result of the Supreme Court failing to articulate clear principles for distinguishing patentable inventions and unpatentable abstract ideas in \textit{Gottschalk v Benson}. The uncertainty was evident from as early as the patent cases of \textit{Arrhythmia} and \textit{Schrader}, where the different judges’ opposing views on whether the law involves a physicality requirement led to the court issuing different outcomes on the question in the two cases. The early disarray was followed by a period in which the liberal views of Plager J and Rich J held sway in \textit{Alappat} (en banc), \textit{AT&T v Excel} and \textit{State Street}, before the court reverted to the restrictive approach taken in \textit{Comiskey, Nuijten, Bilski} (en banc) and \textit{Ferguson}. As far as individual judges are concerned, only Rader and Schrader JJ have delivered consistent and unwavering opinions over the life of the Federal Circuit, both judges being against a physicality requirement.\textsuperscript{508} Other judges have been content to ride the ebbs and flows of the court’s sentiment.\textsuperscript{509}

\textsuperscript{507} \textit{Diamond v Diehr}, 450 US 175, 189 n 12 (1981) (‘To accept the analysis proffered by the petitioner would, if carried to its extreme, make all inventions unpatentable, because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious.’) \textsuperscript{508} Rader J concurred with the majority in \textit{Arrhythmia}, formed part of the majority in \textit{Alappat} and \textit{AT&T v Excel}, and dissented in \textit{Bilski}. Newman J formed part of the majority in \textit{Arrhythmia}, dissented in Schrader, joined the majority in \textit{Alappat}, endorsed \textit{AT&T v Excel} and \textit{State Street} in her dissent in \textit{Bilski} and dissented in \textit{Ferguson}. \textsuperscript{509} Lourie J, who formed part of the majorities in \textit{Arrhythmia, Alappat and Bilski}, is an example.
As should be clear from the preceding analysis of the Federal Circuit cases, it is argued that the Federal Circuit erred by insisting that the machine-or-transformation test is the sole test for patent eligibility. Instead, the argument put forward is that the better view is the more liberal approach of proponents such as Plager, Rich, Rader and Schrader JJ that held sway in cases such as *Alappat, AT&T v Excel* and *State Street*, rather than the restrictive opinions introduced in *Comiskey, Nuijten, Bilski* and *Ferguson*.

V THE REMAINING STRICTURES OF PATENTABILITY WILL EXCLUDE UNDESERVING PATENTS

A Novelty, Inventiveness (Non-obviousness) and Sufficiency of Description

The preceding discussion shows that limiting the statutory subject matter threshold in United States law is not the optimal means of addressing concerns about weak or undeserving patents. Instead, it is the remaining strictures of novelty, nonobviousness and the need to properly describe the invention that are the core determinants of patentability. Therefore, inventions that are capable of being privatised are identified by determining whether they fall within the scope of patentable subject matter or the excluded categories of subject matter, and by applying the strictures of novelty, inventiveness and description.

Rich J explained in *State Street* that the issue of whether claims are too broad is not relevant to statutory subject matter, but to issues raised under §§ 102, 103 and 112.510 Likewise, Kristin Osenga explained the fallacy of relying on § 101 to dispose of difficult subject matter.

The PTO and some commentators are using § 101 rejections as a means to avoid tackling other policy or practical issues that should be handled through other means. The rejections thus serve as proxies for inquiries that should be made more appropriately under other requirements of patentability, such as

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510 *State Street Bank & Trust Co. v Signature Financial Group, Inc.*, 149 F.3d 1368, 1377 (Fed. Cir. 1998).
utility, novelty, nonobviousness, adequate written description, and enablement. 511

This principle seems to have been forgotten by many who have panicked over the emergence of computer software and business method patents. It is true that many computer software and business method patents have been wrongly granted because they claim ideas already in use or non-obvious combinations of existing ideas. It is also true that patent offices have allowed patentees to over-claim on valid patents to capture more than the economic value of their inventions. However, these concerns are not to be met by excising classes of subject matter at the threshold, or by introducing subject matter constraints not found in the statute. 512 While the subject matter inquiry is an important means of eliminating abstract claims, the real focus for patentability is novelty, inventive step and sufficiency of description, which are the better tools for eliminating unworthy patents.

An example of the remaining strictures of patentability in operation is the fact that on remand from the Federal Circuit, the District Court of Delaware in the AT&T v Excel litigation held the patent in question to be invalid under § 102 due to it having been anticipated. 513

If the law is to recognise an expansive scope of subject matter that includes business methods and computer software, the courts must take care when applying the non-obviousness standard. They must ensure that patents that are granted involve something more than merely implementing well known business models in an obvious way. 514 Known real world business models instantiated in software or automated on the Internet will still be patentable, but only when the instantiation requires actual inventiveness, rather than just the application of a process known in one field of endeavour to another. Following this approach, a patent would run only against the specific implementation disclosed. Anyone who could implement the

513 AT&T Corp. v Excel Communications, 52 USPQ 2d 1865 (D. Del. 1999). See above n 261 and accompanying text.
514 Dreyfuss, ‘Are Business Method Patents Bad for Business?’’, above n 264, 278-279.
method and achieve a functionally equivalent useful result by different means, say by creating software that is coded to follow a different process, or adopts a different operating method that contains different steps, would escape infringement. This addresses the real concern that people have with business method and computer software patents, namely that they interfere with the right to conduct activities that are obvious based what has already been disclosed in the public domain.

After the Federal Circuit’s recent decision in *KSR International Co. v Teleflex Inc.*,515 (‘KSR’) it is now much easier for lower courts to reject or invalidate specious claims. In *KSR* the court rejected the Federal Circuit’s ‘teaching, suggestion or motivation’ proxy test as the sole test for obviousness under § 103 in favour of a ‘flexible’ and ‘functional’ approach consistent with the court’s prior decisions.516 There the Supreme Court explained that ‘[h]elpful insights, however, need not become rigid and mandatory formulas’ and ‘[t]he obviousness analysis cannot be confined by a formalistic conception’.517

B  Business Method Prior Use Defence: 35 USC § 273

The Federal Circuit’s machine-or-transformation test is inconsistent with the statutory recognition given to the patent eligibility of non-physical business methods in 35 USC § 273. In 1999, Congress enacted in 35 USC § 273 a prior user defence to infringement of business method patent claims. Section 273 provides a limited personal defence for conduct that would otherwise amount to patent infringement.

The exception is invoked where a person reduced the subject matter to practice at least a year before the filing date of the patent.518 For the defence to apply, the business method must be ‘commercially used’, in the sense of being used ‘in

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516 Ibid 415, 417.
517 Ibid 419.
518 35 USC § 273(b)(1) provides as follows.

It shall be a defense to an action for infringement under section 271 of this title with respect to any subject matter that would otherwise infringe one or more claims for a method in the patent being asserted against a person, if such person had, acting in good faith, actually reduced the subject matter to practice at least 1 year before the effective filing date of such patent, and commercially used the subject matter before the effective filing date of such patent.

35 USC § 273(a)(3) provides that for the purposes of § 273, ‘the term ‘method’ means a method of doing or conducting business.’ The defence must be seen in contrast to the prior use provision in § 102, which may be used as grounds for declaring a patent invalid.
connection with an internal commercial use or an actual arm’s-length sale or other arm’s-length commercial transfer of a useful end result. Of note is the fact that the defence is limited to method claims.

As in § 101, the text of § 273 makes no mention of methods tied to machines or transforming physical matter. The legislative history of § 273 shows that Congress did not intend to limit the defence only to business methods that are tied to machines or that transform physical matter. More so, the legislative history of the provision shows that when it enacted § 273, Congress acknowledged the patent eligibility of a variety of processes which would fail the machine-or-transformation test.

In order to protect inventors and to encourage proper disclosure, this subtitle focuses on methods for doing and conducting business, including methods used with internal commercial operations as well as those used in connection with the sale or transfer of useful end results – whether in the form of physical products, or in the form of services, or in the form of some other useful results; for example, results produced through the manipulation of data or other inputs to produce a useful result.

According to Chisum, et al:

one might argue that Section 273 is confined to methods of doing or conducting business in a narrow sense, for example, methods of arranging financial matters, methods for controlling inventory, and methods for marketing products and services, and does not extend to methods, such as methods for manufacturing products, that have been more traditionally the subject of patents.

The Federal Circuit’s decision to implement its machine-or-transformation test appears to ignore the intent of Congress, as expressed in the legislative history of 35

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519 35 USC § 273(a)(1).
USC § 273. In the ten years since State Street, the USPTO issued more than 15,000 patents classified in the business method technology group by applying the State Street standard. In that time, Congress has not indicated that it disagrees with this practice. By enacting 35 USC § 273, it appears to have endorsed the practice.

Since the provisions of a statute must be read with a view to their place in the overall statutory scheme, sections 273 and 101 must be read together as part of an harmonious whole. Given that § 273 recognises the patent eligibility of non-physical business methods in commercial use, § 101 cannot be construed to exclude them from patent protection. As the introduction of the Federal Circuit’s mandatory machine-or-transformation test would render § 273 a meaningless defence to the infringement of a class of patents that cannot exist, the test cannot be what Congress intended the statutory category of process to entail. Consequently, the Federal Circuit’s failure to address the conflict between the Bilski decision and the clear legislative intent expressed through the adoption of § 273 warrants that Bilski be reversed.

C Other Doctrines From United States Law That Address Weak Patents

A group of 20 law and business professors who filed an amicus brief in the United States Supreme Court in anticipation of that court’s decision in Bilski v Kappos have highlighted three new developments in United States law that reduce the harm caused by weak patents.\(^{523}\)

Firstly, they cite the Supreme Court’s determination in MedImmune, Inc v Genentech, Inc,\(^{524}\) which relaxed the standard to be met for a declaratory judgment of patent invalidity, making it easier for potential defendants to seek to invalidate patents.

Secondly, they cite the Federal Circuit’s recent finding in In re Seagate Tech., LLC,\(^{525}\) that wilful infringement requires objective recklessness. This finding allows potential defendants the freedom to read patents and decide whether to design around

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\(^{524}\) 549 US 118 (2007).

\(^{525}\) 497 F.3d 1360 (Fed. Cir. 2007) (en banc).
or challenge weak patents rather than simply closing their eyes to them by reducing the severity of the consequences of infringement.\textsuperscript{526}

Finally, in \textit{eBay Inc. v MercExchange, LLC},\textsuperscript{527} the Supreme Court held that lower courts have a discretion to deny injunctive relief in accordance with the principles of equity, rather than grant a permanent injunction as of right.

\section*{VI \quad \textbf{The Supreme Court Does Not Favour Rigid Proxy Tests}}

The Supreme Court has repeatedly cautioned against adopting rigid rules in patent cases where the court’s precedents dictate that a broader, more flexible framework is to be followed. The court has shown a willingness to rebuff inadequate proxy tests created by the Federal Circuit in favour of more flexible approaches.\textsuperscript{528}

The court’s criticism of the rigid application of the Federal Circuit’s ‘teaching, suggestion, motivation’ test for evaluating inventions that combine prior art elements in favour of a ‘common sense’ approach in \textit{KSR}\textsuperscript{529} is a prime example. In \textit{KSR} the Supreme Court unanimously rejected the Federal Circuit’s ‘teaching, suggestion, or motivation’ proxy test as the only test for determining obviousness under 35 USC § 103. The Federal Circuit had adopted this proxy test as an attempt to resolve the question of obviousness ‘with more uniformity and consistency’ than would be possible under a straight application of the words in the statute.\textsuperscript{530} The Supreme Court disagreed, rejecting the Federal Circuit’s ‘rigid’ approach, stating that that ‘[h]elpful insights, however, need not become rigid and mandatory formulas’ and ‘[t]he obviousness analysis cannot be confined by a formalistic conception’.\textsuperscript{531} In a telling blow to any attempts to introduce a proxy test as a means of avoiding the application of complicated principles of law, the court cautioned that ‘when a court transforms

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{526} Ibid 1371.
\item \textsuperscript{527} 547 US 388 (2006),
\item \textsuperscript{529} \textit{KSR International Co. v Teleflex Inc.}, 550 US 398 (2007).
\item \textsuperscript{530} Ibid 399.
\item \textsuperscript{531} Ibid 419.
\end{itemize}
\end{footnotesize}
the general principle into a rigid rule that limits the obviousness inquiry, as the Court of Appeals did here, it errs.\textsuperscript{532}

In relation to the doctrine of prosecution history estoppel, the Supreme Court in \textit{Festo Corp. v Shoketsu Kinzoku Kogyo Kabushiki Co.}\textsuperscript{533} discarded the Federal Circuit’s ‘complete bar test’, saying ‘we have consistently applied the doctrine in a flexible way, not a rigid one.’\textsuperscript{534} The court rejected the Federal Circuit’s attempt to impose an ‘absolute’ bar to the application of the doctrine of equivalents when a patent claim is narrowed during prosecution. The Supreme Court unanimously rejected the Federal Circuit’s ‘complete bar’, warning that ‘courts must be cautious before adopting changes that disrupt the settled expectations of the inventing community.’\textsuperscript{535}

In \textit{eBay Inc. v. MercExchange, LLC},\textsuperscript{536} the Supreme Court unanimously rejected the Federal Circuit’s attempt to impose a rule ‘unique to patent disputes, “that a permanent injunction will issue once infringement and validity have been adjudged.”’\textsuperscript{537} Rather than creating a special rule for use in patent cases, the Supreme Court instructed the Federal Circuit to apply traditional principles of equity to determine when an injunction should issue ‘in patent disputes no less than in other cases governed by such standards.’\textsuperscript{538}

In another unanimous decision, the court in \textit{Quanta Computer, Inc. v LG Electronics, Inc.}\textsuperscript{539} rejected an inflexible rule which rigidly limited the doctrine of patent exhaustion to apparatus claims, paving the way for the doctrine to be applied to process claims.\textsuperscript{540}

Given the Supreme Court’s dislike of proxy tests, it is likely that the machine-or-transformation test will be rejected as an inadequate substitute for a proper patentability analysis.

\textsuperscript{532} Ibid.
\textsuperscript{533} 535 US 722 (2002).
\textsuperscript{534} Ibid 738.
\textsuperscript{535} Ibid 739.
\textsuperscript{536} 547 US 388 (2006).
\textsuperscript{537} Ibid 393-394.
\textsuperscript{538} Ibid 394.
\textsuperscript{539} 128 S Ct 2109 (2008).
\textsuperscript{540} Ibid 2117-1218.
Consistent with the constitutional ‘useful arts’ requirement, two centuries of Supreme Court precedent has tied patentability to technological innovation.\(^{541}\) It is suggested that the present day equivalent of the term ‘useful arts’ is ‘technological arts’.\(^{542}\) Accordingly, it is argued that any patent law that does not promote the progress of the ‘useful arts’, or its equivalent, the ‘technological arts’, would be unconstitutional.\(^{543}\)

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\(^{541}\) *Graham v John Deere Co.*, 383 US 1, 9 (1966) (‘The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge. The grant of an exclusive right to an invention was the creation of society -- at odds with the inherent free nature of disclosed ideas -- and was not to be freely given. Only inventions and discoveries which furthered human knowledge, and were new and useful, justified the special inducement of a limited private monopoly.’); *Kewanee Oil Co v Bicron Corp.*, 416 US 470, 480-481 (1974); *Bonito Boats, Inc v Thunder Craft Boats, Inc.*, 489 US 141, 150-151 (1989) (‘The federal patent system thus embodies a carefully crafted bargain for encouraging the creation and disclosure of new, useful, and nonobvious advances in technology and design in return for the exclusive right to practice the invention for a period of years.’); *Pfaff v Wells Electronics, Inc.*, 525 US 55, 63 (1998) (‘the patent system represents a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology in return for an exclusive monopoly for a limited period of time.’); *Quanta Computer, Inc. v LG Electronics, Inc.*, 128 S Ct 2109, 2116 (2008) (“‘the primary purpose of our patent laws is not the creation of private fortunes for the owners of patents but is “to promote the progress of science and the useful arts”’”) quoting *Motion Picture Patents Co. v Universal Film Mfg. Co.*, 243 US 502, 518 (1917) quoting United States Constitution, Art I § 8 cl 8; *Mazer v Stein*, 347 US 201, 219 (1954) (“The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare.’); Mark A Lemley, ‘Ex Ante Versus Ex Post Justifications for Intellectual Property’, above n 123, 130 citing *Mazer v Stein*, 347 US 201, 219 (1954); Mark A Lemley, ‘Property, Intellectual Property, and Free Riding’, above n 133, 1031.

\(^{542}\) *In re Comiskey*, 554 F.3d 967 (Fed. Cir. 2009) quoting *Paulik v Rizkalla*, 760 F.2d 1270, 1276 (Fed. Cir. 1985) *(en banc)* (“The Constitution explicitly limited patentability to “the national purpose of advancing the useful arts—the process today called technological innovation.”); *In re Musgrave*, 431 F 2d 882, 893 (CCPA 1970); *In re Waldbaum*, 457 F 2d 997, 1003 (CCPA 1972) (“The phrase ‘technological arts,’ as we have used it, is synonymous with the phrase ‘useful arts’ as it appears in Article I, Section 8 of the Constitution.”). Arguably the most exhaustive attempt to define the ‘useful arts’ is found in Robert I Coulter’s three part series: Robert I Coulter, ‘The Field of the Statutory Useful Arts (Part I)’ (1952) 34 *Journal of the Patent & Trademark Office Society* 417; Robert I Coulter, ‘The Field of the Statutory Useful Arts (Part II)’, above n 10; Robert I Coulter, ‘The Field of the Statutory Useful Arts (Part III)’ (1952) 34 *Journal of the Patent & Trademark Office Society* 718; Lutz, ‘Patents and Science: A Clarification of the Patent Clause of the U.S. Constitution’, above n 11, 54.

\(^{543}\) *Graham v John Deere Co.*, 383 US 1, 5 (1966) (‘At the outset it must be remembered that the federal patent power stems from a specific constitutional provision which authorizes the Congress “To promote the Progress of . . . useful Arts...” The clause is both a grant of power and a limitation. This qualified authority, unlike the power often exercised in the sixteenth and seventeenth centuries by the English Crown, is limited to the promotion of advances in the “useful arts.”... The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose.’). See *In re Shao Wen Yuan*, 188 F 2d 377, 380 (CCPA 1951) (“It is interesting to note that this particular grant is the only one of the several powers conferred upon the Congress which is accompanied by a specific statement of the reason for it.’); Durham, above n 10, 1426; Thomas, ‘Liberal Professions’, above n 12, 1140; Pollack, above n 12.
and that any patent that does not promote this aim would be invalid. A ‘useful’ or ‘technological arts’ requirement is a good thing, for the reasons that patent law should be a vehicle for promoting technological, rather than non-technological, advances. Such an interpretation is consistent with what the expectations for the clause held by the framers of the United States Constitution are perceived to have been.\textsuperscript{544} Understanding patentable subject matter in this way, however requires an understanding of what ‘technology’ is.

A Defining Technology

The word ‘technology’ is a wide and encompassing concept. It finds its origins in the Greek τεχνη (techne), meaning ‘skill’ or ‘art’.\textsuperscript{545} Narrow definitions ‘technology’ are limited to products of industrial, mechanical, or engineering processes,\textsuperscript{546} while broader definitions include all things created by people to exploit, manage, or manipulate their natural environments.

The Merriam-Webster Online Collegiate Dictionary defines technology as:

1a: the practical application of knowledge especially in a particular area; b: a capability given by the practical application of knowledge; 2: a manner of accomplishing a task especially using technical processes, methods, or knowledge.

Similarly, Thomas Sheridan, General Dictionary Of The English Language (1780) has defined technology as ‘a treatise on the arts, and explanation of terms of art’,\textsuperscript{547}

\textsuperscript{544} Durham, above n 10, 1527.
\textsuperscript{545} Durham, above n 10, 1445 citing L Ttondl, ‘On the Concepts of “Technology” and “Technological Sciences,”’ in Contributions To A Philosophy Of Technology 1, 4 (Friedrich Rapp ed, 1974). See also Noah Webster, Dictionary of the English Language (11th ed, 1833) 35;\textsuperscript{546} See for example Brief for the Respondent, In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc), cert. granted sub nom. Bilski v Doll, 129 S. Ct. 2735 (2009) (No. 08–964) 8, 16-25.\textsuperscript{547} See further, Thomas Sheridan, General Dictionary Of The English Language (1780) (useful: “convenient, profitable to any end, conducive or helpful to any purpose”; art: “the power of doing something not taught by nature and instinct; a science, as the liberal arts; a trade; artfulness; skill; dexterity; cunning”).
while Thomas Mandeville has defined technology as ‘knowledge or information applied to doing things.’

One important aspect of technology is that it requires a description of a device or procedure that can be invoked repeatedly to achieve relatively stable, uniform and predictable results. If technology is the ‘practical application of knowledge’, it must be knowledge applied in a way that is repeatable, such that it gives predictable or near-predictable results each time the information is applied. By ‘technological advances’ what is meant is innovation that is not strictly of an aesthetic character or within the realms of fundamental principles of nature, natural phenomena or abstract ideas. According to Durham, ‘one could define “useful art” as any field of endeavour in which knowledge is applied systematically toward the achievement of definite goals.

Nothing in these definitions limits the concepts of ‘useful arts’ or ‘technology’ to machines or physical transformation. Rather, an appropriate view of ‘technology’ is that it is a broad concept, coextensive with all new and useful technological advances made by human beings that achieve specific practical outcomes.

Widespread computer usage and the corresponding proliferation of computer-implemented information processing techniques has forced us to better understand the nature of technology. This broader contemporary understanding of technology regards information processing methods as being useful ‘tools’ like their physical counterparts. The information-processing methods found, say for example in computer software programs, contain repeatable data processing steps that are of utility because they produce predictable and reliable results in the same way that physical devices and physically-transformative methods do. If information processing advances are capable of reliably producing beneficial and predictable useful results in ways that do not involve manipulating physical content, there seems to be little reason to categorise them as a non-technological discoveries merely because they do

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550 Durham, above n 10, 1452.
not involve a physical embodiment. Given that non-physical information processing advances share the critical features of earlier physical technology, namely practical utility and repeatability, they should be considered to be technological advances in the same way that earlier physical advances are.\textsuperscript{551}

Applying such a broad definition of ‘technology’ without reference to physical constructs to patent eligibility would result in a near limitless patentable subject matter test. It would limit the scope of patentable subject matter only to the extent of excluding the ‘fine arts’ and ideas, principles and natural phenomena that have not been practically applied. The consequence would be that the focus of the test for patentability is the strictures of novelty, inventiveness and sufficiency of description of the invention. As this demonstrates, a broad patentable subject matter test is entirely consistent with this view of technology. As information processing advances assume a central role in our lives, patent rewards should encourage intangible, information processing inventions in the same way that patent rights have previously encouraged tangible inventions.

B ‘Technological Arts’ as a Physical Transformation or Effect

Some commentators\textsuperscript{552} and the USPTO\textsuperscript{553} have identified at least one characteristic they believe is a good indication that an alleged invention falls within the realm of the ‘technological arts’. That characteristic is that the alleged invention discloses a physical transformation or effect. This approach is different to the one taken by the majority in \textit{Bilski}. Even though it put forward the same test, the majority in \textit{Bilski} did not do so by means of ‘useful arts’ limitation.\textsuperscript{554}

\begin{footnotesize}
\textsuperscript{554} \textit{In re Bilski}, 545 F.3d 943, 960-964 (Fed. Cir. 2008) (en banc).
\end{footnotesize}
According to John Thomas, a physicality requirement is one means of giving meaning to a ‘technological arts’ requirement.

[T]echnological activities are concerned with the production or transformation of artifacts through the systematic manipulation of physical forces. Bounded by interaction with the external environment, technological activities expend resources and knowledge in order to fabricate or modify products, or to develop procedural systems for so doing. Furthermore, technology presents a form of rational and systematic knowledge, oriented towards efficiency and capable of being assessed through objective criteria.\textsuperscript{555}

This corresponds with generally held expectations of what the patent system should protect.

The requirement of physical instantiation is not an illogical one. It ties the relatively abstract proprietary interests created by patent law to the corporeal things that form the traditional objects of property.\textsuperscript{556}

The first of these arguments found favour with Administrative Patent Judge Barrett, in the BPAI decisions of \textit{Ex parte Lundgren}\textsuperscript{557} and \textit{Ex parte Bilski}.\textsuperscript{558} It is the views of Barrett APJ, who wrote a dissenting opinion in \textit{Ex parte Lundgren} and the majority opinion in \textit{Ex parte Bilski}, that are of interest in this regard. Barrett APJ held both alleged inventions to be outside the scope of patentable subject matter.\textsuperscript{559}

\textsuperscript{556} Thomas, ‘Liberal Professions’, above n 12, 1147.
\textsuperscript{558} \textit{Ex parte Bilski}, Appeal No 2002-2257 (Board of Patent Appeals and Interferences 2006) (non-precedential). The majority in \textit{Ex Parte Bilski} comprised Administrative Patent Judges Frankfort, Barrett, Bahr and Nagumo, with Administrative Patent Judge McQuade concurring. Barrett APJ wrote on behalf of the majority. \textit{Ex Parte Bilski} was decided by the BPAI before being heard on appeal by the Federal Circuit in \textit{In re Bilski}, 545 F.3d 943 (Fed. Cir. 2008).
\textsuperscript{559} The fact that Barrett APJ wrote a dissenting opinion in \textit{Ex parte Lundgren} and a majority judgment \textit{Ex parte Bilski} means that the BPAI delivered opposing outcomes in those two cases. The reason for the disparate outcomes in these cases is that quite a different Board to the one that heard \textit{Lundgren} constituted that which heard \textit{Bilski}. Of the judges that heard \textit{Lundgren}, only Barrett APJ was to be found on the \textit{Bilski} board, and it was his views that held sway in \textit{Bilski}. So, it cannot be said that the different outcomes in \textit{Lundgren} and \textit{Bilski} indicate a Board that cannot make up its mind. Rather, the
In both opinions, Barrett APJ distinguished machine-implemented and non-machine-implemented processes. After rejecting the view that the sole test for statutory subject matter is the now defunct ‘useful, concrete and tangible result’ test, Barrett APJ held that non-machine-implemented processes must produce a physical transformation of matter from one state to another; otherwise, they are not directed to the ‘technological arts’ and represent an abstract idea or mere intellectual information.\(^{560}\) In effect, Barrett APJ foresaw the Federal Circuit’s machine-or-transformation of subject matter test, but unlike the Federal Circuit, based the test on a ‘technological arts’ limitation.

As to what type or degree of physical effect or transformation is required, the only hints Barrett APJ gave were that ‘insignificant post-solution activity will not transform an unpatentable subject matter into a patentable process’ and the ‘chemical, electrical, or mechanical transformations taking place by or within a human being are not the type of transformation indicating a process within the “useful arts” of § 101’.\(^{561}\)

The problem with Barrett APJ’s opinion is that he fails to articulate why a ‘technological arts’ limitation necessitates a physical element other than to say that it corresponds with pre-conceived and widely held notions of what should be patentable. He fails to consider that a broad understanding of the concepts of science and technology, especially in the Information Age, would include innovation manifested in a non-corporeal form.

C ‘Technological Arts’ as the Application of Science and Technology

There is a second school of thought regarding what a ‘technological arts’ limitation might entail. In his dissenting opinion in the Federal Circuit’s decision in *Bilski*, Mayer J argued in favour of a ‘technological arts’ test limited to advances in science


\(^{561}\) *Ex parte Lundgren*, 76 USPQ 2d 1385 (Board of Patent Appeals and Interferences 2005) (precedential).
and technology, which he saw as consistent with the historical purpose of the patent system. In Mayer J’s opinion, patents for business methods and other methods not involving advances in science and technology are not permitted. He focused heavily on the policy arguments that lie against allowing patents over business methods to support his holding that Bilski’s claims are not deserving of patent protection. Mayer J found Bilski’s claims unpatentable because their inventive aspect is entrepreneurial rather than technological.\textsuperscript{562}

Mayer J’s opinion does not involve a physicality requirement. A finding that there is a ‘technological arts’ requirement that allows only patents involving advances in science and technology does not necessarily mean inventions must involve a physical object or cause a physical transformation to be patent eligible.

D Industrial Application

Another restriction on the scope of patent law sees its only goal as the furtherance of industrial activities.\textsuperscript{563} According to Alan Durham, the protection of industrial activities is what the framers of the United States Constitution intended,\textsuperscript{564} while Gruner disagrees, arguing that the framers would have used the expression, ‘industrial arts’ had they intended the power to be so limited instead of purposefully using broader language directing patent law to the promotion of the ‘useful arts’.\textsuperscript{565}

While this test has obvious appeal, it ignores the important role the patent system plays in non-industrial business contexts. While the framers of the United States Constitution obviously had industrial activities in mind when drafting the statute, there is nothing to suggest they intended this to be the extent of the intellectual property clause’s reach, say to the exclusion of commercial activities.\textsuperscript{566}

\textsuperscript{562} \textit{In re Bilski}, 545 F.3d 943, 998 (Fed. Cir. 2008) (Mayer J) (dissent).

\textsuperscript{563} In this section, it is assumed that the term, ‘industrial application’, takes its natural meaning, rather than the narrower interpretation used in Article 27.1 of the TRIPS Agreement, which in a footnote states that the terms ‘inventive step’ and ‘capable of industrial application’ may be deemed by a member state to be synonymous with the terms ‘non-obvious’ and ‘useful’ respectively.

\textsuperscript{564} Durham, above n 10, 1454. See also Thomas, ‘Liberal Professions’, above n 12, 1143; Thomas, ‘The Post-Industrial Patent System’, above n 264, 7.

\textsuperscript{565} Gruner, ‘Intangible Inventions’, above n 549, 375.

\textsuperscript{566} Ibid 375-376.
While such a test may superficially appear to be consistent with traditional expectations of the role of the patent system, patent eligibility has never actually been limited in this way. Rather, this is a test that is inconsistent with the policy of the patent system to promote innovation in all fields of endeavour, which the Supreme Court has made clear by holding that ‘any’ process is patent eligible, not just industrial processes.

E  The Supreme Court May Yet Acknowledge a Useful Arts Limitation

The ‘useful arts’ or ‘technological arts’ are advanced by allowing patent rights over inventions. If a patent is granted in respect of subject matter that is properly an invention, then the ‘useful arts’ or ‘technological arts’ requirement is met. As was affirmed by the Federal Circuit in *Bilski*, there is no additional ‘useful arts’ or ‘technological arts’ limitation. Rather, the implication is that the limitation is coextensive with the current state of the patent law.

In relation to the position at law in the United States, the argument that there is a ‘technological arts’ limitation should not be dismissed out of hand because it is still possible that the United States Supreme Court could adopt it despite its rejection by the Federal Circuit. Even though, as acknowledged by the Federal Circuit, the ‘contours of such a test… would be unclear’ this does not mean that the constitutional limitation is of no effect.

VIII  CONCLUSION

A  Competing Schools of Thought on the Physicality Issue

United States patent law is at a crossroads. One road leads to a patent system that protects the sorts of non-physical innovation we are likely to see during the Information Age. The other ties patentability to technologies of a mechanical and industrial era. There is currently much uncertainty and disagreement as to which of these roads the law ought to follow.

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567 *In re Bilski*, 545 F.3d 943, 960 (Fed. Cir. 2008).
568 Ibid.
The uncertainty and disagreement that exists regarding the scope of patentable subject matter stems from the Supreme Court’s failure to articulate clear principles for distinguishing patentable inventions from unpatentable abstract ideas in the 1972 *Gottschalk v Benson* decision. While the Supreme Court has made clear that ‘[a]n idea of itself is not patentable’, what its precedents lack is an explanation of what distinguishes an unpatentable abstract idea from a practical application of an idea that is patent eligible. This failure appears to be due largely to the fact that, for the most part, the Supreme Court has had before it easy cases that have involved claims to physical devices or methods that are physically transformative in nature, and has not had significant exposure to claims that are not. Given the lack of clear guidance from the Supreme Court, it is not surprising that the Federal Circuit would seek to establish a test to fill the void.

As has been shown, there are two competing schools of thought on this issue. On one hand is the argument of the majority in *Bilski* that the Supreme Court’s precedents impose a physicality requirement and that the broad view of patentable subject matter taken in cases such as *Diamond v Chakrabarty* and *State Street* applies only to inventions proper, being those that involve a physical element. Proponents of this

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569 Chisum, above n 95, 991.

570 *Rubber-Tip Pencil Co. v Howard*, 87 US 498, 507 (1874).

571 Gruner, ‘Undiscovered Country’, above n 95, 400. See for example the ‘easy cases’ of *Corning v Burden*, 56 US 252, 267 (1854) (in which the patent eligibility of the ‘arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores’ was confirmed); *Burr v Duryee*, 68 US 531, 566 (1863) (‘a new and useful improvement in the machine for making hat-bodies’); *Rubber-Tip Pencil Co. v Howard*, 87 US 498, 507 (1874); *Cochrane v Deener*, 94 US 780 (1876) (a process for manufacturing flour so as to improve its quality); *Tilghman v Proctor*, 102 US 707, 721 (1880) (a process of ‘manufacturing fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure’); *Dolbear v American Bell Telephone Co (The Telephone Cases)*, 126 US 1 (1888) (a method of using electricity to transmit speech); *Expanded Metal Co. v Bradford*, 214 US 366 (1909) (a process for expanding metal); *Smith v Snow*, 294 US 1 (1935) and *Taxham v Smith*, 294 US 20 (1935) (a process for setting eggs in staged incubation and applying mechanically circulated currents of air to the eggs); *Parker v Flook*, 437 US 584 (1978) (a method of ‘updating alarm limits’ used in the catalytic conversion of hydrocarbons, which the court held to not be patentable subject matter); *Diamond v Diehr*, 450 US 175 (1981) (a process for operating a computer-controlled rubber mould in which the sole new design elements were innovative information processing features); *Diamond v Chakrabarty*, 447 US 303 (1980) (live, artificial, human-made, genetically engineered micro-organisms).

572 *O'Reilly v Morse*, 56 US 62 (1854) (in which Morse’s claim 5, which involved ‘the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for telegraphic purposes’ (Morse code) ‘for a process of using electromagnetism to produce distinguishable signs for telegraphy’, was held to be patentable as an ‘art’); *Gottschalk v Benson*, 409 US 63 (1972) (a method for converting binary-coded decimal numbers into pure binary numbers, which the court held to be not patentable) are exceptions.
argument take the view that physicality is the dividing line that distinguishes inventions proper from the excluded categories of abstract ideas, fundamental principles and natural phenomena. 573

On the other hand is the argument that denying the patent eligibility of non-physical inventions is inconsistent with established precedent and with the goal of the patent system to promote innovation in whatever form it arises and without discrimination between classes of invention. Proponents of this argument take the view that the Supreme Court precedents state that physicality is only ‘the clue’ to determining patent eligibility, not a requirement. According to this view, physicality is not relevant to the § 101 analysis, as it is not the dividing line that distinguishes inventions proper from abstract ideas, fundamental principles and natural phenomena. 574

B The Better View: There is No Physicality Requirement

The view put forward in this chapter is that the Federal Circuit erred by insisting that the machine-or-transformation test is the sole test for patent eligibility in the face of clear Supreme Court precedent that dictates that physical transformation is only an example of patentable subject matter. This is based on the premise that the Supreme Court, in its trilogy of algorithm cases, stated that there is no requirement that a process must transform or reduce an article to a different state or thing to be patent

573 This view is supported by the majority in In re Schrader, 22 F.3d 290 (Fed. Cir. 1994) (Plager J); the unanimous decision in In re Comiskey, 554 F.3d 967 (Fed. Cir. 2009) (Michel CJ, Dyk and Prost JJ); the majority in In re Nuijten, 500 F.3d 1346 (Fed. Cir. 2007) (Gajarsa and Moore JJ); Ex parte Lundgren 76 USPQ 2d 1385 (Board of Patent Appeals and Interferences 2005) (precedential); the majority in In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc) (Michel CJ, Lourie, Schall, Bryson, Gajarsa, Linn, Dyk, Prost, and Moore JJ); the majority in In re Ferguson, 558 F.3d 1359 (Fed. Cir. 2009) (Gajarsa and Mayer JJ); and Prometheus v Mayo, 581 F.3d 1336 (Fed. Cir. 2009) (Michel CJ, Lourie J, and District Judge Clark from the United States District Court for the Eastern District of Texas sitting by designation.).

574 This view is supported by In re Prater, 415 F.2d 1393, 1403 (CCPA 1969); In re Musgrave, 431 F 2d 882, 893 (CCPA 1970); Arrhythmia Research Technology, Inc. v Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992); In re Schrader, 22 F.3d 290 (Fed. Cir. 1994) (Newman J) (dissent); In re Alappat, 33 F.3d 1526 (Fed Cir 1994) (Rich J filed an opinion on behalf of the majority, with whom Newman, Lourie, Michel, Plager and Rader JJ joined); State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998) (Rich J filed an opinion on behalf of himself and Plager and Bryson JJ); AT&T Corp. v Excel Communications, Inc., 172 F.3d 1352 (Fed Cir 1999) (Plager J delivered the court’s unanimous opinion on behalf of himself and Clevenger and Rader JJ); In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc) (Newman, Rader JJ); In re Ferguson, 558 F.3d 1359 (Fed. Cir. 2009) (Newman J) (concurring-in part, dissenting-in-part).
eligible. While the involvement of a physical machine or a physical transformation of matter is indicative of an invention being patent eligible, it is not the case that a lack of physicality will automatically render an invention ineligible under § 101. Rather, the presence of a physical effect or transformation of matter is merely ‘the clue’ that indicates that a claimed process is patent eligible.

In addition, the Supreme Court has distinguished the machine and process categories, and has certainly not required that a process be tied to a machine.

It is very certain that the means need not be a machine, or an apparatus; it may, as the Court says, be a process. A machine is a thing. A process is an act or a mode of acting. The one is visible to the eye -- an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result.

Instead, the Supreme Court has provided that any process is patentable subject matter provided that it does not claim a fundamental principle, a law of nature or an abstract principle, but rather claims a useful practical result. Thus, the dividing line between patentable inventions proper and mere abstract ideas is not physicality. Where the dividing line lies can be ascertained only by a thorough understanding of the scope of the recognised categories of excluded matter. Thus, it is the distinction between a new, specific and useful practical application of a fundamental principle or idea and

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575 In re Bilski, 545 F.3d 943, 962 (Fed. Cir. 2008) (‘It is virtually self-evident that a process for a chemical or physical transformation of physical objects or substances is patent-eligible subject matter.’).

576 AT&T Corp. v Excel Communications, Inc., 172 F.3d 1352, 1357-1358 (Fed. Cir. 1999) (Plager J) quoting Diamond v Diehr, 450 US 175, 192 (1981). This view is supported by the CCPA decisions in Prater and Musgrave, both decided before the Supreme Court’s trilogy of algorithm cases, which explained that Cochrane v Deener, 94 US 780 (1876) did not create a rule or definition requiring that all processes, to be patentable, must operate physically on substances: see above nn 89-92 and accompanying text; In re Bilski, 545 F.3d 943, 984 (Fed. Cir. 2008) (Newman J) citing In re Prater, 415 F.2d 1393, 1403 (CCPA 1969).

577 Tilghman v Proctor, 102 US 707, 728 (1880).

578 cf: In re Bilski, 545 F.3d 943, 954 (Fed. Cir. 2008); In re Comiskey, 554 F.3d 967, 978 (Fed. Cir. 2009); In re Ferguson, 558 F.3d 1359, 1363 (Fed. Cir. 2009) citing In re Bilski, 545 F.3d 943, 954 (Fed. Cir. 2008) (‘the machine-or-transformation test is the “definitive test to determine whether a process claim is tailored narrowly enough to encompass only a particular application of a fundamental principle rather than to pre-empt the principle itself.”’).
the recognised categories of excluded matter that marks the dividing line, not the Federal Circuit’s machine-or-transformation test.

In *Bilski* the Federal Circuit attempted to craft a simple rule that could be easily applied to determine subject matter eligibility in the no-so-easy cases involving non-physical inventions. As is clear from the preceding analysis of the Federal Circuit cases, it is argued that the Federal Circuit’s insistence upon its machine-or-transformation test is fundamentally inconsistent with the approach endorsed by the Supreme Court.\(^{579}\) Although superficially attractive, the machine-or-transformation test is not coextensive with the scope of patent eligible subject matter, and wrongfully excludes subject matter that is rightfully patent eligible. In the absence of clear legislative guidance stipulating that process patents must be tied to a particular machine or transform matter, the courts should not impose such limitations. The Supreme Court has more than once cautioned that the courts should not read into the patent laws limitations and conditions which the legislature has not expressed.\(^{580}\)

The Federal Circuit’s machine-or-transformation test not only conflicts with § 101 and the Supreme Court’s precedents, but also is inconsistent with the Patent Act’s recognition that business methods are eligible for patenting. In 1999, Congress enacted a prior user defence in 35 USC § 273 for infringement of business method patent claims. In this provision, Congress embraced both business methods and the broad and flexible approach to patent eligibility espoused in *State Street*. The legislative history of this provision demonstrates that Congress did not intend to limit the operation of the § 273 defence to business methods that are tied to machines or that transform articles. Consequently, § 101 must be read broadly in light of § 273 to include methods of doing business that are not tied to particular machines and do not physically transform matter.

Despite strong arguments that *Bilski* was wrongly decided, the decision now represents the state of law. As a consequence of denying the patentability of non-physical inventions, the United States is arguably in breach of Article 27.1 of the

\(^{579}\) In *re Bilski*, 545 F.3d 943, 967-977 (Newman J) (dissent), 1013 (Rader J) (dissent) (Fed. Cir. 2008).

TRIPS Agreement, which requires that ‘patents shall be available for any inventions, whether products or processes, in all fields of technology’.

C The Patenable Subject Matter Test in the United States

The United States patentable subject matter standard is grounded in the constitutional mandate to promote the progress of ‘useful arts’. Patentable subject matter under § 101 comprises any ‘new and useful’ invention that lies within the ‘useful arts’, but falls outside the recognised categories of excluded matter.\textsuperscript{581}

Requiring a special test for the ‘process’ category is inconsistent with the plain language of § 101. The language of § 101, which states that ‘any’ new and useful is process patent eligible does not extend patent protection to some subcategories of processes but not others. Moreover, the language of § 101 does not allow for the courts to place additional limits on patent eligible subject matter that have not been expressed by Congress.

The recognised categories of excluded matter are fundamental principles of nature, natural phenomena and abstract ideas. Natural laws and phenomena can never qualify for patent protection because they cannot be invented. Abstract ideas are not eligible because they are not ‘useful’ and must be applied to a practical use before they can be patented. There is no recognised exclusion of processes that involve or wholly consist of mental steps,\textsuperscript{582} or processes that do not involve a physical aspect. While the scope of the recognised categories of excluded matter has yet to be explained in significant detail by the courts, it is clear that patent eligibility hinges on the distinctions between discoveries and the application of human ingenuity, and between the abstract and what has been reduced to practice. This is necessarily a dull line delineation, not a

\textsuperscript{581} That this is the correct test for determining whether an invention is patent eligible is evident from the Supreme Court decisions: \textit{Gottschalk v Benson}, 409 US 63 (1972); \textit{Parker v Flook}, 437 US 584 (1978); \textit{Diamond v Chakrabarty}, 447 US 303, 309 (1980); \textit{Diamond v Diehr}, 450 US 175, 182, 185 (1981). It is also evident from the Federal Circuit decisions: \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc.}, 149 F.3d 1368 (Fed. Cir. 1998); \textit{In re Alappat}, 33 F.3d 1526 (Fed Cir 1994); \textit{AT&T Corp. v Excel Communications, Inc.}, 172 F.3d 1352. Further, it is evident in the dissent of Newman J in \textit{In re Schrader}, 22 F.3d 290 (Fed. Cir. 1994), \textit{In re Bilski}, 545 F.3d 943 (Fed. Cir. 2008) (en banc), and \textit{In re Ferguson}, 558 F.3d 1359 (Fed. Cir. 2009).

\textsuperscript{582} Arguably, these recognised categories of excluded matter do not include the ‘mental steps’ included in \textit{Gottschalk v Benson} and \textit{Parker v Flook}; see \textit{Diamond v Diehr}, 450 US 175, 182, 185 (1981) and \textit{Diamond v Chakrabarty}, 447 US 303, 309 (1980).
bright line test, whose contours will be continue to be shaped in the case law on a case-by-case basis. The Federal Circuit has gone much further that the law by which it is bound allows in limiting patents on processes, holding that the only patent eligible processes are those that meet the machine-or-transformation test.

After a decade of uncertainty, the ‘useful, concrete, and tangible result’ label that was applied to the subject matter inquiry by Rich J in State Street has been retired. While rejecting the label because it confused the law was a sensible step to take, the substantive reasons for the decisions in Alappat, State Street and AT&T v Excel are of continuing importance because they recognise that the focus of the subject matter inquiry is practical utility, not category-based exclusions.

D  Section 101 is Not the Proper Means for Controlling Patent Quality

Any concerns that potentially vague or trivial patents are being granted should be addressed by the other requirements for patentability. While § 101 provides a valuable threshold, it is the remaining strictures of patentability, utility, novelty, nonobviousness, sufficiency of written description, and enablement, that are the focus of patentability and are the tools for eliminating undeserving patents. Proper enforcement of the novelty and nonobviousness requirements in §§ 102 and 103 will prevent patents that claim old and well-known processes being awarded.583 Second, § 101 is not intended to protect against overbroad claims. That is the role of § 112, which demands that the inventor clearly describe and distinctly claim the invention. The existing requirements for patentability properly applied are better suited than the machine-or-transformation test to prevent vague or trivial patents being granted.

E  Possible Outcomes From Bilski v Kappos

There are four likely outcomes that might result from the Supreme Court’s consideration of Bilski v Kappos. The most likely outcome is that the court will strike out the machine-or-transformation test and any notion that a physicality requirement

583 In re Bergy, 563 F.2d 952, 960 (CCPA 1979). Since the decision in KSR International Co. v Teleflex Inc., 550 US 398, 420-421 (2007) it is now clear that § 103 bars patents for improvements that result from mere ‘common sense’ or ‘ordinary creativity.’
is good law, in favour of the patentable subject matter standard applied in *Diamond v Diehr* and *State Street*.

The second possibility is that the Supreme Court could conceivably follow the Federal Circuit’s lead and endorse the machine-or-transformation proxy test as the sole test for patent eligibility. This would arguably bring a drastic change to the existing law. If the court were to take this route, it would still need to decide a number of issues. These include what sort of physical requirement is necessary and whether the involvement of a computer will be enough to make software patentable and how this is to be accommodated within the rubric of the machine-or-transformation test.

The third possibility is that the Supreme Court could conceivably endorse the machine-or-transformation test as a presumptive test, or means of indicating patent eligibility that could be displaced in appropriate circumstances, rather than a hard and fast rule or essential element of patent eligibility. If it were to do so, it would need to give some indication of the circumstances in which the machine-or-transformation test is likely to be inadequate. However, it is difficult to see the value in such an approach that acknowledges that the test used does not in adequately represent the standard of patent eligibility.

A fourth possibility is the court devising its own proxy test for the subject matter enquiry to replace the machine-or-transformation test.

The possibility of the court resorting to the second, third or fourth possibilities, given its recent repudiation of ‘rigid’ rules established by the Federal Circuit in *KSR International Co. v Teleflex Inc.*,584 *Festo Corp. v Shoketsu Kinzoku Kogyo Kabushiki Co.*,585 and *Quanta Computer, Inc. v LG Electronics, Inc.*,586 is unlikely. Further, given the expansive nature of its earlier precedents, it is unlikely that the court will

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584 550 US 398 (2007) (the court criticised the Federal Circuit’s ‘rigid’ application of its ‘TSM’ (teaching, suggestion, motivation) test for evaluating nonobviousness, instead preferring a ‘flexible’ and ‘functional’ approach consistent with the court’s prior decisions.).
586 128 S Ct 2109 (2008) (the court rejected an inflexible rule which rigidly limited the doctrine of patent exhaustion to apparatus claims).
adopt any blanket rules excluding specific categories of subject matter such as business methods and computer software.

*Bilski v Kappos* presents an opportunity to rule on a question of law that has broad implications for various fields of technology, such as business methods, software and medical treatment, but does not present a specific question regarding those technologies. However, this does not prevent the Supreme Court handing down a technology-neutral view of the scope of patentable subject matter that clarifies the law that applies to all areas of technology, even though the case itself concerns only a hedging method.

Given the strong arguments that identify the errors in the Federal Circuit’s reasoning, it is likely that on appeal, the United States Supreme Court will quash the decision, reject the rigid and inappropriate machine-or-transformation test, and remand the matter to the BPAI.  

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587 The United States Supreme Court has granted *certiorari* to hear the matter on appeal: *Bilski v Doll*, (June 1, 2009). Bilski petitioned the United States Supreme Court seeking a writ of *certiorari*, which was granted: *Bilski v Doll*, No 08-964, 2009 US LEXIS 4103 (Fed Cir, filed 30 January 2009) (granted 1 June 2009, Order List 556).
CHAPTER 4 - PATENTABLE SUBJECT MATTER IN AUSTRALIA

I INTRODUCTION

This chapter addresses the issue of whether Australian patent law contains a physicality requirement. It is argued that this issue has not been satisfactorily resolved in Australia, despite the Federal Court of Australia in 2006 finding in Grant v Commissioner of Patents (‘Grant’)¹ that to be patentable subject matter, a method must produce ‘some physical phenomenon or effect’.² Instead, it is argued that the Federal Court’s decision was not properly reasoned and is not good law because it is inconsistent with existing case law the Federal Court was bound to follow.³

It is recognised that the Australian position in relation to this question is to be determined by reference to: the Australian constitutional and statutory scheme; the history, purpose and theories of the patent system; and by taking a comparative law approach that considers the experiences had in foreign jurisdictions. Consequently, the chapter is organised in the following way. Part II provides an overview of the requirements for patentability under Australian law. Part III focuses in detail upon the requirement that a patentable invention be a ‘manner of manufacture’, which is the test used to determine whether an alleged invention is patentable subject matter in Australia. This involves a survey of the cases that have considered the concept of manufacture since the passing of the Statute of Monopolies 1623, to decide whether the concept involves a physicality requirement. Part IV contains an analysis of Grant, which was the first Australian decision in which the patent eligibility of a non-physical invention was directly at issue. This case is analysed in light of the knowledge gained in respect of the history and theories of the patent system, and the history of the concept of ‘manner of manufacture’. Part V considers the experiences had in the United States in respect of non-physical inventions, and identifies lessons

¹ [2006] FCAFC 120.
² Ibid [47].
Australian courts can take from United States jurisprudence. Part VI considers the effect, if any, that ‘useful arts’, ‘technological arts’ and industrial application limitations might have on Australian law. Part VII explains that it is the strictures of novelty, inventiveness and the requirement that an invention be properly described, that are the focus of patentability, rather than subject matter concerns. It explains that it is these limitations that will exclude undeserving subject matter from the benefits of patent protection. The chapter concludes in Part VIII that Australian patent law does not contain a physicality requirement and explains what the test for determining whether an invention is patent eligible subject matter is, and how it is to be applied in circumstances where non-physical inventions are concerned.

II PATENTABLE INVENTIONS IN AUSTRALIA

In Australia, patents are available to protect new inventions that are novel, inventive and of practical utility, provided that they fall within the scope of recognised patentable subject matter that has been developed by the common law courts over time.4

There are two types of patents in Australia: standard patents and innovation patents. Standard patents confer monopoly protection for a term of 20 years.5 Innovation patents, which require a significantly lesser degree of inventiveness, are awarded for a term of 8 years.6

A Constitutional and Legislative Framework

Patent law in Australia is a matter of federal legislative concern and its sources lie in both statute and the common law. The Federal Parliament’s power to legislate with

4 Patents Act 1990 (Cth) s 18.
5 Patents Act 1990 (Cth) s 67.
respect to patent law lies in s 51 (xviii) of the *Australian Constitution*, which since Federation, has empowered the Parliament to make laws with respect to intellectual property. Also relevant when considering Parliament’s power to make laws with respect to intellectual property is the external affairs power in s 51(xxix) of the Constitution, which among other things, allows the Parliament to enact legislation to meet Australia’s obligations at international law.

Section 51 (xviii) of the *Australian Constitution* provides as follows.

> The Parliament shall, subject to this Constitution, have power to make laws for the peace, order, and good government of the Commonwealth with respect to:
> ...
> (xviii) copyrights, patents of inventions and designs, and trademarks;…

With regard to the generality of the words of s 51(xviii), the High Court of Australia, upholding the constitutional validity of the *Circuit Layouts Act 1989* (Cth) in *Nintendo Co Ltd v Centronics Systems Pty Ltd*, said:

> It is of the essence of that grant of legislative power that it authorizes the making of laws which create, confer, and provide for the enforcement of, intellectual property rights in original compositions, inventions, designs, trade marks and other products of intellectual effort.

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7 *Australian Constitution (Commonwealth of Australia Constitution Act 1900) (Imp) 63 & 64 Vict, c 12, s 9*.
8 As a signatory to international treaties that deal with intellectual property matters, Australia has obligations at international law, most notably under the *Paris Convention for the Protection of Industrial Property 1883* (‘Paris Convention’) and the *Agreement on Trade-Related Aspects of Intellectual Property Rights* (‘TRIPS Agreement’).
10 (1994) 181 CLR 134.
11 Ibid 160 (Mason CJ, Brennan, Deane, Toohey, Gaudron and McHugh JJ). In a similar fashion, the High Court in *Grain Pool of Western Australia v Commonwealth of Australia* (2000) 202 CLR 479
The High Court in *Grain Pool of Western Australia v Commonwealth of Australia*\(^{12}\) (‘*Grain Pool*’) identified similarities between s 51(xviii) and the intellectual property clause in the *United States Constitution*. While it showed that both provisions set forth a broad legislative power in respect of patents for invention, the court rejected the suggestion that the United States text is expressed more generally than s 51(xviii), noting that the purposive focus of the United States provision limiting patentability to promoting the progress of ‘useful arts’ is not replicated in the *Australian Constitution*.\(^{13}\)

The differences between the two constitutional provisions are significant in demonstrating that the sufficiency of the connection between Australian legislation and the constitutional head of power will not necessarily be constricted in this fashion. In particular, it will be open to the Parliament to pursue its policies by legislation with respect to various subject-matters, if one of them appears in s 51(xviii) on an adequate reading of that text.\(^{14}\)

However, given that the Australian provision must be interpreted in light of what the term, ‘patents of inventions’ was understood to mean at the time the *Constitution* was adopted, that understanding must come from an historical appreciation of the scope of the term as it has developed over time.\(^{15}\) As will be explained below, while there is no constitutional limitation to this effect, the common law of Australia requires that patents only be granted for inventions that fall within the ‘useful arts’.\(^{16}\)

In terms of the existence or otherwise of a physicality requirement, neither the *Australian Constitution*, nor the *United States Constitution*, expressly require that an


\(^{13}\) *Grain Pool of Western Australia v Commonwealth of Australia* (2000) 202 CLR 479, 497.

\(^{14}\) Ibid 497-498 citing *Murphyores Incorporated Pty Ltd v The Commonwealth* (1976) 136 CLR 1, 11-12, 22.

\(^{15}\) Ibid 491-493.

\(^{16}\) *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 275-277.
invention must produce a physical effect or cause a physical transformation of matter to be patentable.

In pursuance of its constitutional power, the Commonwealth Parliament has made laws with respect to patents of invention. The first Commonwealth patent legislation enacted by the Australian Federal Parliament was the *Patents Act 1903* (Cth), which was based on the United Kingdom *Patents, Designs and Trade Marks Act 1883* (46 & 47 Vict c 57). That Act overrode the previous patent legislation that had been enacted in each of the Australian colonies. The 1903 Act has since been repealed and replaced by the *Patents Act 1952* (Cth), which was in turn repealed by the current legislation, *Patents Act 1990* (Cth), which came into force on 1 May 1991.

Granting a patent for a non-physical invention is not prohibited by s 51 (xviii) of the *Australian Constitution*. The historical analysis in Chapter 2 above shows that ‘patents of inventions’ have not historically been limited to traditionally recognised mechanical, chemical or other physically-instantiated inventions. Therefore, non-physical inventions must fall within the purview of the constitutional power that supports the validity of the *Patents Act 1990* (Cth).

**B Statutory Requirements for Patentability**

The test for determining patentability lies in s 18 of the *Patents Act 1990* (Cth) and the definition of the term ‘invention’.\(^{17}\) Section 18 requires that for a standard patent, an ‘invention’ be a ‘manner of manufacture’ within the meaning of section 6 of the

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\(^{17}\) *Patents Act 1990* (Cth) s 18 and Schedule 1 (which defines ‘invention’). The term ‘invention’ has long been associated with patent law. While not used in the *Statute of Monopolies*, it appears in the earliest Patent Rolls and literature of England and in subsequent United Kingdom and Australian patent legislation, including the two Acts that supplemented the *Statute of Monopolies* prior to 1883: *An Act to Amend the Law Touching Letters Patent for Inventions 1835* (UK) 5 & 6 Wm IV, c 83 (1835 Act) and *Patent Law Amendment Act 1852* (UK) 15 & 16 Vict, c 83 (1852 Act). The term ‘invention’ has been defined in all Australian patent legislation to date and in all United Kingdom patent legislation from 1852 to 1977 to mean ‘any manner of new manufacture’ within the meaning of s 6 of the *Statute of Monopolies* including, since 1883, ‘an alleged invention’. See *Patent Law Amendment Act 1852* (UK) 15 & 16 Vict, c 83 s LV; *Patents, Designs & Trade Marks Act 1883* (UK) 46 & 47 Vict c 57 s 46; *Patents and Designs Act 1907* (UK) 7 Edw 7, c 29 s 93; *Patents Act 1949* (UK) 12, 13 & 14 Geo 6, c 86 s 101; *Patents Act 1903* (Cth) s 4; *Patents Act 1952* (Cth) s 6; and *Patents Act 1990* (Cth) Sch 1. See *Northern Territory v Collins* [2008] HCA 49, [96] (Crennan J); Justine Pila, ‘Inherent Patentability in Anglo-Australian Law: A History’ (2003) 14 *Australian Intellectual Property Journal* 109, 110 nn 2, 5.
Statute of Monopolies,\textsuperscript{18} be novel, involve an inventive step, be useful and not have been used in secret.

Section 18(1) relevantly provides that:

an invention is a patentable invention for the purposes of a standard patent if the invention, so far as claimed in any claim:

(a) is a manner of manufacture within the meaning of section 6 of the Statute of Monopolies; and

(b) when compared with the prior art base as it existed before the priority date of that claim:

(i) is novel; and

(ii) involves an inventive step; and

(c) is useful; and

(d) was not secretly used in the patent area before the priority date of that claim by, or on behalf of, or with the authority of, the patentee or nominated person or the patentee’s or nominated person’s predecessor in title to the invention.\textsuperscript{19}

The separate heads of patentability listed in s 18 reflect the different elements found in s 6 of the Statute of Monopolies.\textsuperscript{20} The courts have held that these heads of patentability are to be considered separately and the issues that relate to one head are

\textsuperscript{18} 21 Jam 1, ch 3 (1623) (Eng).
\textsuperscript{19} 21 Jam 1, ch 3 (1623) (Eng). Schedule 1 to the Act makes it plain that the reference in s 18 to the Statute of Monopolies is to the English Statute of Monopolies 21 Jam 1, ch 3 (1623) (Eng). It is, however, to be noted that s 18(1)(a) refers to ‘manner of manufacture’ instead of ‘manner of new manufacture’ as is used in the Schedule 1 definition of ‘invention’, and previous legislation, including the Statute of Monopolies itself. This distinction did not appear in patent legislation prior to 1990. According to the Full Court in CCOM v Jiejing (1994) 122 ALR 417, 446, the grounds of novelty, inventive step, utility and secret use have each been excised from a general body of case law which interpreted the expression ‘manner of new manufactures’ found in s 6 of the Statute of Monopolies and placed separately in legislation. It said that this is made particularly clear as paragraph (a) of the subsection refers to ‘manner of manufacture’ rather than to ‘manner of new manufactures’. The court at 446-447 illustrated the operation of this concept by way of example when it said, ‘[t]hus, whilst a claim for the ball point pen now would fail for anticipation and obviousness, it would still be a claim for a manner of manufacture.’

\textsuperscript{20} Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd (1998) 194 CLR 171, 195 (Kirby J) quoting The Mullard Radio Valve Co Ltd v Philco Radio and Television Corporation of Great Britain Ltd (1936) 53 RPC 323, 339 (Lord Macmillan) (‘the legislation includes “all the stereotyped pleas long familiar in patent practice which have now been given statutory recognition”’).
not applicable to another. The requirements for an innovation patent are similar, the difference being that the inventive step requirement is replaced by the lesser requirement of an innovative step. The only subject matter expressly excluded from patentability where both standard and innovation patents are concerned is stated in s 18(2) to be ‘human beings and the biological processes for their generation’. Section 18 does not expressly require that an invention be capable of industrial application, fall within the useful or technological arts, or be implemented in some form of technology; nor does it allow for the exclusion of inventions that would otherwise be patentable on *ordre public* or morality grounds. Finally, there is nothing in the legislation that expressly requires that an invention produce a physical effect or cause a physical transformation of matter.

In addition to the heads of patentability listed in s 18(1), the High Court in *NV Philips Gloeilampenfabrieken v Mirabella International Pty Ltd*, held that the opening words of the section create a threshold requirement that an alleged invention must satisfy before it need be tested against the listed heads of patentability.

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22 Patents Act 1990 (Cth) s 18(1A). The meaning of the expression ‘innovative step’ was considered in Delnorth Pty Ltd v Dura-Post (Aust) Pty Ltd [2008] FCA 1225, where the Federal Court held that the term includes technological contributions that may be obvious, but nevertheless contribute substantially to the working of the technology to which they relate.

23 Patents Act 1990 (Cth) s 18(2). This provision has not been considered judicially, however an indication of how the provision will be applied can be gleaned from IP Australia’s *Manual of Practice and Procedure*, which states that inventions that are ‘clearly encompassed’ by the provision include: human beings, foetuses, embryos or fertilised ova; methods of in vitro fertilisation or cloning methods that generate human beings; and processes, beginning with fertilisation and ending with birth, that are wholly biological and result in a human being: IP Australia, *Patent Manual of Practice and Procedure Volume 2: National* (2002), [8.5.1]-[8.5.2]. See also, *Woo-Suk Hwang* [2004] APO 24 (a decision of a deputy commissioner of patents made in reliance upon s 18(2) to reject a patent application for a form of embryonic stem cell research, being for a method of generating a human being, which is unlawful according to the *Prohibition of Human Cloning for Reproduction Act 2002* (Cth)). In addition, s 18(3) sets out additional subject matter than is excluded for the purpose of innovation patents. It provides that: ‘For the purposes of an innovation patent, plants and animals, and the biological processes for the generation of plants and animals, are not patentable inventions.’ In addition, the Commissioner of Patents has the discretion to refuse a patent application for a standard patent on the ground that its use would be ‘contrary to law’ or the invention is merely a mixture of known ingredients capable of being used as a food or medicine for humans or animals, or is a process to produce such a substance by mere admixture: *Patents Act 1990* (Cth) s 50(1)(a). The Commissioner may revoke an innovation patent on equivalent grounds: *Patents Act 1990* (Cth) s 101B.

In Australia, it has traditionally been thought that patents are the domain of engineering, applied science and industrial manufacturing. This traditional conception of the role of the patent system, inherited from mid-nineteenth century British law, involves an assumption that patent protection is limited to the creation of physical articles and methods that involve a transformation of matter. While it may appear that Australian patent law is yet to completely dispel this assumption, Australian courts have nevertheless recognised new and varied forms of innovation as patentable subject matter. They have accepted as patent eligible claims to horticultural and agricultural methods, genetic materials and recombinant DNA techniques, methods of treating the human body, computer software and business methods.

An examination of this case law reveals that excluding categories of invention from patentability is not what the Australian courts intend for the patentable subject matter test.

Australia is one of a number of countries that continues to use the ‘manner of manufacture’ test to determine the scope of patentable subject matter. The test stems from section 6 of the Statute of Monopolies, which in accordance with the common law, rendered void all monopolies, provided that the invalidating provisions of the statute:

shall not extend to any [letters] Patents and Graunt of Privilege for the tearme of fowerteene yeares or under, hereafter to be made of the sole working or

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25 The King v Wheeler (1819) 2 B. & Ald. 345, 349; 106 ER 392, 394-395; Lionel Bently and Brad Sherman, Intellectual Property Law (2001) 310 (‘the image of the invention as the human intervention into nature that brings about a resulting physical change that underpins much contemporary jurisprudence, was well entrenched in British law by the mid-nineteenth century.’).


30 Welcome Real-Time SA v Catusity Inc [2001] FCA 445, [125]-[126]; Grant v Commissioner of Patents [2006] FCAFC 120, [26]. See also State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998); cert denied, 119 S Ct 851 (1999), which has had a significant persuasive influence on Australian law.
How the terminology of the manner of manufacture test from a 400-year-old English statute is to be applied in modern times was explained by the High Court of Australia in the landmark case of National Research Development Corporation v Commissioner of Patents31 (‘NRDC’). It is now well settled that the decision and reasoning of the High Court of Australia in NRDC clarified the law regarding patentable subject matter in Australia.32 Various reviews of Australian patent law have recommended that the manner of manufacture requirement be preserved in its current form, despite its antiquated and technical language potentially being confusing to those not intimately with the intricacies of Australian patent law.33

31 (1959) 102 CLR 252 (Dixon CJ, Kitto, and Windeyer JJ).

33 The Industrial Property Advisory Committee (‘IPAC’), in its 1984 review of the Patents Act 1952 (Cth), Industrial Property Advisory Committee, ‘Patents, Innovation and Competition in Australia’ (1984) 41, considered that the manner of manufacture concept operates satisfactorily and has shown a favourable capacity to respond to new technological developments. It recommended (recommendation
2 Novelty

A patent will only be granted for an invention that is novel. An invention is novel if it has not been disclosed to the public through prior publication or use. The novelty requirement is to be distinguished from any requirement that an invention be ‘new’. The need for an invention to be ‘new’ means that it cannot merely be the discovery of a naturally occurring substance or principle of nature. Novelty involves a comparison between the invention claimed and the existing known technology that has previously been disclosed to the public. It requires comparing the invention and the prior art as it existed before the priority date. Where an invention has been disclosed in the publicly available prior art before the priority date of the claim in question, it is said...
to have been anticipated by that prior disclosure, other than where disclosure arises in circumstances that impose an obligation of confidence on the recipient of the information.\textsuperscript{36} An invention lacks novelty only if all its essential integers (or elements) have been revealed to a member of the public in circumstances that leave that person free to make use of that information without any obligation of confidence.\textsuperscript{37}

That an invention must not have been previously known to the public is a common law principle that dates back to \textit{Darcy v Allen,}\textsuperscript{38} where it was made clear that ‘odious’ monopolies in respect of things already known or used ought not be granted because of the injustice and inconvenience they unjustly cause existing traders and the public at large by raising prices without bringing any attendant public benefit.

3 \textit{Inventive Step}

A standard patent will be granted in Australia only for an invention that involves an ‘inventive step’.\textsuperscript{39} The ‘inventive step’ hurdle is not a difficult one to cross. An invention is taken to involve an inventive step when compared with the prior art base unless the invention would have been obvious to a person skilled in the relevant art in

\textsuperscript{36} The novelty of each claim in a patent application is assessed against the ‘prior art base’ that comprises publicly available ‘prior art information’ as it existed at the priority date of the relevant patent claim. The prior art base includes information that is made publicly available in a document or a related series of documents, or through doing an act or a related series of acts, as well as information contained in a published patent application that has an earlier priority date than the application under examination. Disclosure of an invention in more than one document, or by more than one act, will only be considered together if the relationship between the documents, or the acts, is such that a person skilled in the relevant art would treat them as a single source of information. The test for novelty of standard and innovation patents is the same: \textit{Patents Act 1990} (Cth) s 7, 18(1)(b)(i), 18(1A)(b)(i) and Sch 1.

\textsuperscript{37} \textit{Griffin v Isaacs} (1938) 12 ALJ 169; \textit{Fomento v Mentmore} [1956] RPC 87. The test for determining whether an invention lacks novelty is the reverse infringement test. Infringement of a claim occurs where 'each and every one of the essential integers' of that claim have been taken. Thus, the test for novelty is that a piece of prior art will anticipate an invention if that prior art contains all the essential elements of the invention. If an essential feature is not disclosed in the prior art reference, the claim is novel: \textit{Meyers Taylor Pty Ltd v Vicarr Industries Ltd} (1977) 137 CLR 228, 235 (Aiken J) ("The basic test for anticipation or want of novelty is the same as that for infringement and generally one can properly ask oneself whether the alleged anticipation would, if the patent were valid, constitute an infringement."); \textit{Rodi and Wienenberger AG v Henry Showell Ltd}, (1969) RPC 367, 391.

\textsuperscript{38} (1603) 11 Co Rep 84b; 77 Eng Rep 1260 (The Case of Monopolies).

\textsuperscript{39} \textit{Patents Act 1990} (Cth) s 18(1)(b)(ii).
the light of the common general knowledge as it existed in the patent area before the priority date.\footnote{The ‘patent area’ under the \textit{Patents Act 1990} (Cth) is the area that lies the within the territorial limits of the Commonwealth of Australia. This means Australia, the Australian continental shelf, the waters above the Australian continental shelf, the airspace above Australia and the Australian continental shelf: \textit{Patents Act 1990} (Cth) sch 1, Dictionary.}

The law in Australia concerning inventive step was most recently considered by the High Court of Australia in \textit{Lockwood Security Products Pty Ltd v Doric Products Pty Ltd}.\footnote{\textit{Patents Act 1990} (Cth) s 7(2). Section 7(2) tests whether an invention is obvious when compared with the ‘prior art base’, and s 7(3) tests whether information is to be included in the ‘prior art base’.} There the court said that it is accepted that determining whether a patent involves an inventive step is a question ‘of degree and often it is by no means easy’, because ingenuity is relative, depending as it does on relevant states of common general knowledge' that existed in Australia before the priority date of the claim.\footnote{\textit{Lockwood Security Products Pty Ltd v Doric Products Pty Ltd} [2004] HCA 58, [51] citing \textit{John McIlwraith Industries Ltd v Phillips} (1958) 98 CLR 529, 536 (Dixon CJ). See also \textit{Aktiebolaget Hässle v Alphapharm Pty Ltd} (2002) 212 CLR 411, 427 citing \textit{Société Technique de Pulverisation Step v Enson Europe Ltd} [1993] RPC 513, 519 (Hoffmann LJ).}

When determining whether an invention involves an inventive step, a court is to consider what a hypothetical person or research group skilled in the art would have considered to be obvious in the circumstances. The High Court described the test for inventive step as being ‘whether the invention would have been obvious to a non-inventive worker in the field, equipped with the common general knowledge in that particular field as at the priority date.’\footnote{Ibid.}

Although there is no verbal formula that precisely is synonymous with the concept of obviousness,\footnote{\textit{Wellcome Foundation Ltd v V R Laboratories (Aust) Pty Ltd} (1981) 148 CLR 262, 270 (Aickin J); \textit{Minnesota Mining & Manufacturing Co v Biebersdorf (Aust) Ltd} (1980) 144 CLR 253, 293-295 (Aicken J).} it has been said that the level of inventiveness required in Australia is that there be a tiny trace or spark or ‘scintilla of invention’\footnote{\textit{Johns-Manville Corporation’s Patent} [1967] RPC 479, 493-494 (Diplock LJ).} or that there be ‘some difficulty overcome, some barrier crossed’\footnote{\textit{Woolworths Ltd v W B Davis and Son Ltd Inc} (1942) 16 ALJ 57, 59 (Williams J) confirmed in \textit{Aktiebolaget Hässle v Alphapharm Pty Ltd} (2002) 212 CLR 411, 431. See also \textit{Meyers Taylor Pty Ltd v Vicarr Industries Ltd} (1977) 137 CLR 228, 249 (Aickin J).} to distinguish patentable advances over
the prior art from advances which ‘any fool’, or any ‘unimaginative’ or ‘non-inventive worker in the field’ could devise. The High Court has said that ‘obvious’ means ‘very plain’. It is irrelevant whether the invention was arrived at as a matter of chance or luck or the result of long experiment or great intellectual effort. There is no distinction between obviousness and a lack of inventive step. The question is always ‘is the step taken over the prior art an “obvious step” or “an inventive step”? ’

The ‘common general knowledge’ referred to is the general body of knowledge, or the background of knowledge or experience, known or used by those skilled in the relevant art. The classic formulation that describes common general knowledge is that of Aicken J in *Minnesota Mining & Manufacturing Co v Beiersdorf (Aust) Ltd.*

The notion of common general knowledge itself involves the use of that which is known or used by those in the relevant trade. It forms the background knowledge and experience which is available to all in the trade in considering the making of new products, or the making of improvements in

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53. *Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd* (1998) 194 CLR 171, 187 (Brennan CJ, Gaudron, McHugh and Gummow JJ) (‘Further, “an invention which comes to a man by a happy flash of inspiration or without any prolonged experiment or thought may be as good a subject-matter of a patent as one which has only been arrived at after long and difficult experiments”, and a valid patent might be obtained under the Act “for something stumbled upon by accident [or] remembered from a dream” if it otherwise satisfied the requirements of the legislation.’) citing *Longbottom v Shaw* (1891) 8 RPC 333, 337 and *Wellcome Foundation Ltd v V R Laboratories (Aust) Pty Ltd* (1981) 148 CLR 262, 286 affirmed in *Lockwood Security Products Pty Ltd v Doric Products Pty Ltd* [2004] HCA 58, [56]; *Wellcome Foundation Ltd v V R Laboratories (Aust) Pty Ltd* (1981) 148 CLR 262, 279 (Aicken J) citing *Dow Corning Corporation’s Application* [1969] RPC 54, 560 (Graham J); *Crane v Price* (1842) 4 Man & G 580, 605; 134 ER 239, 249 (Tindal CJ).
old, and it must be treated as being used by an individual as a general body of knowledge.\textsuperscript{56}

It also includes prior art information in existence before the priority date that a person skilled in the art could reasonably be expected to have ascertained, understood and regarded as relevant.\textsuperscript{57} However, it does not include information a person skilled in the relevant art would find through a routine literature search.\textsuperscript{58}

The distinction between novelty and inventive step was explained by Windeyer J in \textit{Sunbeam Corporation v Morphy-Richards (Aust) Pty Ltd}.\textsuperscript{59}

When want of novelty was asserted, the thing or process claimed as an invention was assumed to be an invention that is the product of the inventive faculties; but it was said that it was not now at the date of the patent, having been earlier invented and disclosed to the public. When want of subject matter, or lack of inventiveness, was asserted the thing or process claimed as an invention was assumed to be a new thing or process not previously disclosed to the public; but it was said that it was not really an invention and thus not a proper subject matter for the grant of a patent.\textsuperscript{60}

4 \textit{Usefulness}

Section 18 requires that an invention must be useful in order to be patentable.\textsuperscript{61} The usefulness requirement has a particular meaning. The requirement of utility under Australian law is that the invention must work to produce the results promised by the patentee in the specification.\textsuperscript{62} An invention will not satisfy the requirement if it is possible for another person to come within the claims of the patent by the making of a

\textsuperscript{56} Ibid.
\textsuperscript{57} \textit{Patents Act 1990} (Cth) ss 7, and schedule 1.
\textsuperscript{58} \textit{Aktiebolaget Hässle v Alphapharm Pty Ltd} (2002) 212 CLR 411, 426, 430, 434.
\textsuperscript{59} (1961) 180 CLR 98.
\textsuperscript{60} Ibid 111.
\textsuperscript{61} \textit{Patents Act 1990} (Cth) ss 18(1)(c), ss 18(1A)(c). Usefulness is not an express requirement that is considered upon examination of an Australian patent application. Therefore, the Commissioner of Patents does not have to be satisfied that an invention is useful under s 18(1)(c) before accepting a patent application: ss 49(1); 101B(2). Usefulness is a ground for revocation of a standard patent under s 138(3)(b) and opposition s 59(b).
\textsuperscript{62} \textit{Ehrlich v Ihlee} (1888) 5 RPC 437, 455.
product or the carrying out of a process, but not achieve the benefit of the invention as promised by the patentee in the specification. This may occur where the specification omits a necessary feature or features of the invention.\(^63\) It does not require that an invention be useful in the sense that it is worthwhile or commercially viable; only that if a particular result is claimed, it must be achievable.\(^64\)

5  Not Secretly Used

The final requirement in s 18 is that the invention must not have been secretly used within the patent area before the priority date. The provision refers to secret use by, or with the authority of, a patentee or nominated person or his or her predecessor in title.\(^65\)

Secret use refers to non-public use that does not affect an invention’s novelty. The rationale behind allowing a patent to be revoked where the invention was used in secret before the priority date is:

- to prevent a patentee from gaining a longer monopoly than the statutory period by enjoying a period of de facto monopoly through the secret use before the priority date, without meeting the corresponding obligation attaching to such a monopoly, namely the public disclosure of the invention.

This can be traced back (at least) to the informative case of Morgan v Seaward (1837) 2 M & W 544, 150 ER 874, where Parke B said (at 559): “... if the inventor could sell his invention, keeping the secret to himself, and, when it was likely to be discovered by another, take out a patent, he might

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\(^63\) Welch Perrin & Co Pty Ltd v Worrel (1961) 106 CLR 588, 602; Rescare Ltd v Anaesthetic Supplies Pty Ltd (1992) 25 IPR 119, 143.

\(^64\) Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd (1998) 194 CLR 171, 187; Abbott Laboratories v Corbridge Group Pty Ltd (No 2) [2001] FCA 810, [22] (Gyles J); Lane Fox v Kensington and Knightsbridge Electric Lighting Company [1892] 3 Ch 424, 430-431. Note that article 1 of the Australia–United States Free Trade Agreement (AUSFTA) defines ‘useful’ as meaning of ‘industrial application’.

\(^65\) Patents Act 1990 (Cth) ss 18(1)(d), 18(1A)(d). The priority date is the date at which the claims of an alleged invention are tested against the s 18 heads of patentability: s 43.
have, practically, a monopoly for a much longer period than fourteen years.”

Use of an invention for reasonable trial and experiment is not taken to be secret use, nor is use occurring solely in the course of a confidential disclosure of the invention, use for any purpose other than the purpose of trade or commerce, or use on behalf of the government. Secret use that occurs other than by, or with the authority of, a patentee is irrelevant as far as patentability under s 18 is concerned, but will be relevant to establishing rights of prior user.

6 The Threshold Requirement of Inventiveness

In Philips v Mirabella, the High Court held that, in addition to the heads of patentability listed in s 18, the opening words of the section that appeared at the time, impose ‘a threshold requirement of inventiveness’ or ‘newness’ that an alleged invention must satisfy before it need be tested against the listed heads of patentability. The view taken was that the threshold requirement stems from the condition that only an ‘invention’ can be the subject of patent protection and requires that an alleged invention must be a ‘manner of new manufacture’.

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66 Azuko Pty Ltd v Old Digger Pty Ltd [2001] FCA 1079, [180] (Gyles J) citing Morgan v Seaward (1837) 2 M & W 544, 559; 150 ER 874, 880 (Parke B) (emphasis in original).
67 Patents Act 1990 (Cth) s 9. According to Heery J in Azuko Pty Ltd v Old Digger Pty Ltd [2001] FCA 1079, ‘[t]he provision is limited to trial or experiment to see how the product of an invention performs and whether any improvements are needed, as distinct from commercial or marketing assessments.’
68 Patents Act 1990 (Cth) s 119 provides that prior use of an invention by a person before the priority date makes the person exempt from an infringement claim.
70 NV Philips Gloeilampenfabrieken v Mirabella International Pty Ltd (1995) 183 CLR 655, 663-666; Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd (1998) 194 CLR 171, 192. These cases were decided at a time when the introductory words read, ‘a patentable invention is an invention that…’. However that wording has since been amended by the Patents Amendment (Innovation Patents) Act 2000 (Cth) to state, ‘an invention is a patentable invention…if…’. It would not appear there is any reason to doubt that the ‘threshold requirement of inventiveness’ remains despite the amendment. The argument in Philips v Mirabella was accepted by only a bare majority of the court, 3-2. The minority (Dawson and McHugh JJ) adopted a different approach, that s 18 makes no attempt to define invention and merely specifies the criteria which an invention must meet in order to be patentable.
71 NV Philips Gloeilampenfabrieken v Mirabella International Pty Ltd (1995) 183 CLR 655, 663-664 (Brennan, Deane and Toohey JJ). The term, ‘invention’ used in s 18 is defined in the dictionary in Schedule 1 to the Act in the following way: ‘[I]nvention means any manner of new manufacture the subject of letters patent and grant of privilege within section 6 of the Statute of Monopolies, and includes an alleged invention.’ The word ‘alleged’ (ie ‘and includes an alleged invention’) of the definition goes only to the epithet ‘new’: Commissioner of Patents v Microcell Ltd (1959) 102 CLR 232; National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252,
The consequence is that an invention must be disclosed on the face of a patent application. This requirement will not be met if, on its face, it is apparent that the invention does not differ from existing inventions or does not involve any scintilla of inventiveness, without the need to compare it with the prior art base. If it is not met, there is no need to move on to consider the further requirements such as novelty and inventiveness. This was explained in *Philips v Mirabella*.

The effect of those opening words of s 18(1) is that the primary or threshold requirement of a “patentable invention” is that it be an “invention”. Read in the context of s 18(1) as a whole and the definition of “invention” in the Dictionary in Sch 1, that clearly means “an alleged invention”, that is to say, an “alleged” “manner of new manufacture the subject of letters patent and grant of privilege within s 6 of the Statute of Monopolies”. In the light of what has been said above about what is involved in an alleged manner of new manufacture, that threshold requirement of “an alleged invention” will, notwithstanding an assertion of “newness”, remain unsatisfied if it is apparent on the face of the relevant specification that the subject matter of the claim is, by reason of absence of the necessary quality of inventiveness, not a manner of new manufacture for the purpose of the Statute of Monopolies. That does not mean that the threshold requirement of “an alleged invention” corresponds with or renders otiose the more specific requirements of novelty and inventive step (when compared with the prior art base) contained in s 18(1)(b). It simply means that, if it is apparent on the face of the specification that the quality of the inventiveness necessary for there to be a proper subject of letters patent under the Statute of Monopolies is absent, one need go no further.\

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261-262; *NV Philips Gloeilampenfabrieken v Mirabella International Pty Ltd* (1995) 183 CLR 655, 663-664; *CCOM v Jiejing* (1994) 122 ALR 417, 446 (‘Sir Stafford Cripps S-G said that there were, in reality, two distinct questions, “Is there a manner of manufacture?” and “Is the manufacture a new manufacture?”; the first was capable of solution upon a study of the specification itself. *Re Application for a Patent by Compagnies Reunies des Glaces et Verres Speciaux du Nord de la France* (1931) 48 RPC 185 at 188’). 72

Excluded as a result of the threshold requirement are ‘combination claims’, ‘collocations’ and ‘mere new uses of known materials’. In order for ‘combination claims’ or a ‘mere collocation of integers’ to be patentable, the combination must be more than just the sum of its parts, that is, there must have been an element of inventiveness in the decision to assemble the particular components chosen to create something new and useful.\textsuperscript{73} Similarly, a method that involves nothing but ‘the use of a known material in the manufacture of known articles for the purpose of which its known properties make that material suitable’ will also fail for lack of inventiveness.\textsuperscript{74} The principle was stated in \textit{Commissioner of Patents v Microcell Ltd},\textsuperscript{75} (‘Microcell’) in the following way.

Many valid patents are for new uses of old things. But it is not an inventive idea for which a monopoly can be claimed to take a substance which is known and used for the making of various articles, and make out of it an article for which its known properties make it suitable, although it has not in fact been used to make that article before.\textsuperscript{76}

In the same way, in \textit{Welch Perrin & Co Pty Ltd v Worrel},\textsuperscript{77} Dixon CJ, Kitto and Windeyer JJ considered the validity of a patent for a mechanical invention for a mechanical hay rake. Their Honours said:

It was not seriously disputed that it is for a combination, in the sense that word bears in patent law. That is to say, what is described is a machine, the elements of which are all well known and simple mechanical integers, but combined so that they are not a mere collocation of separate parts, but interact to make up a new thing.\textsuperscript{78}


\textsuperscript{74} \textit{Commissioner of Patents v Microcell Ltd} (1959) 102 CLR 232, 251; \textit{NV Philips Gloeilampenfabrieken v Mirabella International Pty} (1995) 183 CLR 655.

\textsuperscript{75} (1959) 102 CLR 232.

\textsuperscript{76} Ibid 249.

\textsuperscript{77} (1961) 106 CLR 588.

\textsuperscript{78} Ibid 611.
While all of these descriptions listed so far relate to collocations of mechanical devices and physical elements, it is clear the concept is equally applicable to non-physical and information-based advances of the Information Age. The High Court in *Advanced Building Systems Pty Ltd v Ramset Fasteners (Aust) Pty Ltd* made this clear when it pointed out using generic language that the expression ‘new thing’ includes a ‘new result’ or ‘a new way of achieving an old purpose or the fulfilment of a new purpose’, and ‘a new combination of features to obtain an improved result’.  

The High Court in *Lockwood Security Products Pty Ltd v Doric Products Pty Ltd (No 2)* (‘*Lockwood v Doric (No 2)*’), in the context of discussing admissions made in a specification, has recently clarified to some extent this uncertain part of the law by explaining that the threshold requirement is not an additional element of patentability that must be addressed in every case. There the High Court said that:

> The decision in *Microcell* has not always been properly understood; it does not involve a separate ground of invalidity or a discrete “threshold” test.\(^79\)

Rather, the threshold requirement is a means by which the patent office, or a court, can strike out an application on the basis that it would certainly be stuck out on novelty or obviousness grounds, without the need to resort to comparing the alleged invention with the prior art. In this sense, it is true that the threshold is not a separate requirement, but an expedient means of avoiding the costs and delays associated with proving a lack of novelty inventive step by reference to prior art and common general knowledge.\(^82\)

The threshold is not a means for courts to rule, in an *ad hoc* manner or on policy grounds, that a particular invention or class of invention, is not an ‘invention’ for the purposes of the threshold and thus not patentable, without considering whether the

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\(^80\) (2007) 235 CLR 173.


alleged invention discloses a manner of new manufacture. In other words, a court could not rely on the threshold requirement to rule that a particular invention is of a class that the court does not believe should be within the scope of patentable subject matter.

The threshold requirement of inventiveness comes into play when the lack of inventiveness is so apparent from a reading of the patent specification that it is unnecessary to adduce evidence of a prior art base, or where the alleged invention is obviously not new or novel. However, Lord Hoffman in Biogen v Medeva® has warned that even where the alleged subject matter is so obviously not an invention that it is tempting to dismiss the claim without inquiring closely into which of the elements of patentability have not been satisfied, ‘Judges would therefore be well advised to put on one side their intuitive sense of what constitutes an invention until they have considered the questions of novelty, inventiveness and so forth.’

C Exclusive Rights of the Patentee and Infringement

Section 13 of the Patents Act 1990 (Cth) provides that upon the grant of a patent, certain exclusive rights vest in the patentee. The exclusive rights granted to a patentee are to ‘exploit’ the patent within the patent area during the term of the patent.

Patents are a right to exclude others from using an invention, rather than a right to use the invention per se, which is a right that would accrue to the patentee irrespective of whether a patent had been issued, and that the patentee would share with everyone in

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83 Bristol-Myers Squibb Co v FH Faulding & Co Ltd [2000] FCA 316, [30].
85 Ibid 42.
86 Patents Act 1990 (Cth) s 13. The right to ‘exploit’ the patent, as defined in the Dictionary in schedule 1 of the Patents Act 1990 (Cth), includes:
(a) where the invention is a product—make, hire, sell or otherwise dispose of the product, offer to make, sell, hire or otherwise dispose of it, use or import it, or keep it for the purpose of doing any of those things; or
(b) where the invention is a method or process—use the method or process or do any act mentioned in paragraph (a) in respect of a product resulting from such use.
the world in the absence of patent protection. The exclusive rights to exploit the patent are personal property and are capable of assignment and devolution by law.

The Patents Act 1990 (Cth) does not define ‘infringement’. Rather, it is implied that patent infringement occurs when someone other than the patentee, or someone authorised by the patentee, exercises any of the exclusive rights to exploit the invention.

D Disclosure of the Invention to the Public

Patent law in Australia, as in other jurisdictions, requires that in exchange for the monopoly protection granted, a patent applicant must disclose the invention and its workings to the public in a patent specification, which is lodged at the time a patent application is filed. A complete patent specification must ‘describe the invention fully, including the best method known to the applicant for performing the invention’.

The specification must disclose the invention in sufficient detail and with sufficient clarity to allow a person skilled in the relevant art to make or carry out the invention. The level of disclosure required is such that the skilled addressee ought to be able to produce something within each claim, without the need for new inventions or additions or prolonged study.

88 Patents Act 1990 (Cth) s 13(2).
89 The position is different in the United Kingdom and the United States: Patents Act 1977 (UK), 60(1); 35 USC § 271. While this statement is true for direct infringement, s 117, headed, ‘Infringement by supply of products’, deals specifically with what is known as ‘contributory’, ‘indirect’, ‘participatory’ or ‘secondary’ infringement: Northern Territory v Collins [2008] HCA 49, [100] (Crennan J). Note also that the Act mentions infringement specifically where it establishes exceptions to infringement in ss 118-119A and offers protection for innocent infringement in s 123.
91 Patents Act 1990 (Cth) s 40(2)(a).
The specification is read in light of the common general knowledge of a person skilled in the art before the priority date.\textsuperscript{93} The High Court explained this requirement in the following way.

On the one hand, the Patentee must make the nature of his invention, and how to perform it, clear and intelligible; on the other hand, it is not necessary for him to instruct persons wholly ignorant of the subject-matter to which his invention relates, in all that they must know before they can understand what he is talking about. The Patentee is adding something to what was known before, and he does all that is necessary as regards the language he uses, if he makes the nature of his invention, and how to perform it, clear and intelligible to persons having a reasonably competent knowledge of what was known before on the subject to which his patent relates, and having reasonably competent skill in the practical mode of doing what was then known.\textsuperscript{94}

The patent specification must also set out claims that define the scope of the patent monopoly sought by the applicant.\textsuperscript{95} There must be consistency between what is described in the patent specification and the claims made. The patent claims must be ‘clear and succinct and fairly based on the matter described in the specification’.\textsuperscript{96} This is known as the ‘fair basis’ requirement.

Disclosure of an invention in a patent specification is an essential element in national innovation systems, because that disclosure adds to the store of human knowledge and can form the basis of further innovation by others. In addition, the public may use invention free of charge at the end of the patent term when the patent falls into the public domain.\textsuperscript{97}

\textsuperscript{93} \textit{Minnesota Mining & Manufacturing Co v Beiersdorf (Aust) Ltd} (1980) 144 CLR 253.
\textsuperscript{94} \textit{Samuel Taylor Pty Ltd v SA Brush Co Ltd} (1950) 83 CLR 617, 624-625.
\textsuperscript{95} \textit{Patents Act 1990} (Cth) s 40(2)(b).
\textsuperscript{96} \textit{Patents Act 1990} (Cth) s 40(3). It appears that in Australia, a failure to fully describe the invention or provide the best method of performing the invention, can be rectified up to at least grant of the patent, so therefore, these requirements do not need to be met at the date the patent application is filed. See \textit{Pfizer Overseas Pharmaceuticals v Eli Lilly and Company} [2005] FCFCA 224.
\textsuperscript{97} \textit{CCOM v Jiejing} (1994) 122 ALR 417, 433.
Physical Effect in Patent Law

There is a common thread between patentable subject matter and the disclosure requirements. If an applicant claims an abstract idea or fundamental principle, the applicant will have not made a disclosure that is sufficient to enable a person skilled in the art to perform an invention.

III THE CONCEPT OF ‘MANUFACTURE’

The key focus of this chapter is an examination of the manner of manufacture concept as it has developed through the case law over time. As the High Court in NRDC has explained, the question to be asked in determining whether an invention is a patentable subject matter is: ‘Is this a proper subject of letters patent according to the principles which have been developed for the application of s 6 of the Statute of Monopolies’? 98

This methodology is employed to determine whether there is anything in the history of case law that can be used to support or reject the proposition that Australian patent law and the manner of manufacture concept involves a physicality requirement. Conducting an analysis of this sort requires an examination of the history of inherent patentability since enactment of the Statute of Monopolies. Included in this discussion is a consideration of the pre-1977 case law from the United Kingdom, 99 and the Australian case law to date. 100 Given the age of much of the case law concerned, this is a difficult undertaking since many of the earlier cases were decided at a time when technology was thought to be grounded in physical artifacts and when today’s computing and information-processing technologies had not even been imagined, let alone conceived. Essentially, what is sought is language in the jurisprudence to indicate whether judges over time have been open to the possibility that patent eligible technology might exist in a form that is free of physical embodiment. As a

matter of caution, it is noted that many of the earlier cases were written at a time when courts were grappling with the concepts of patentability. ¹⁰¹

A Pre-NRDC Cases Discussing ‘Manner of Manufacture’

1 Boulton and Watt v Bull

Judicial consideration of inherent patentability begins with the 1795 decision of Boulton and Watt v Bull. ¹⁰² Boulton and Watt v Bull is the first substantive English law decision to consider what an invention is and what the limits of the scope of patentable subject matter are. ¹⁰³ Chief Justice Eyre noted that the law at the time did not contain guidance to inform this issue.

Though we have had many cases upon patents yet I think we are here upon ground which is yet untrodden, at least was untrodden till this cause was instituted, and till the discussion were entered into which we have heard at the bar, and now from the court. ¹⁰⁴

The case involved a challenge to a patent held by James Watt, which broadly claimed a method of reducing the consumption of steam, and consequently, fuel in steam engines (then called fire-engines). ¹⁰⁵ The invention was an improvement on existing steam engine technology. Watt’s improvement was to have the condenser in a separate vessel from the steam cylinder. The method was described in the specification as the application of certain principles of nature in way to achieve its purpose. The method involved keeping the engine cylinder hot by insulating it, and by providing a separate vessel, which was kept cool, and within which the steam was

¹⁰¹ Not all of the earlier opinions were written by judges. Some were written by Attorneys-General or Solicitors-General.
¹⁰² (1795) 126 ER 651 (Eyre CJ, Buller, Heath, Rooke JJ).
¹⁰³ Prior to Boulton and Watt v Bull, questions as to patentable subject matter had arisen in two cases that concerned additions to known machinery, but did not expressly consider whether an invention must have a physical aspect: Morris v Bramsom (1776) G 311 (NP); R v Arkwright (1785) 1 Web Pat Cas 64 (KB).
¹⁰⁴ Boulton and Watt v Bull (1795) 126 ER 651, 665 (Eyre CJ).
¹⁰⁵ Ibid 667 (Eyre CJ).
to be condensed. This new method avoided the heat loss suffered when the steam was condensed in the cylinder itself.\textsuperscript{106}

The court construed the issue to be resolved as being whether the alleged invention is a patentable process or merely an unpatentable ‘principle’. If the alleged invention were nothing more than a principle, the patent would be invalid for lack of patentable subject matter. This was a contentious question as the patentability of processes, as opposed to new machines or chemical substances, had not previously been considered and upheld in a court of law. The judges of the Court of Common Pleas who heard the case were divided equally 2-2 on this point. Eyre CJ and Rooke J held the patent to be valid, while Heath and Buller JJ held it to be invalid.

While the judges all appeared to agree that there can be no patent for a mere principle, they differed as to how this rule was to be applied. Chief Justice Eyre understood a ‘principle’ to be an ‘abstract notion’,\textsuperscript{107} as distinct from a ‘practical manner of doing’,\textsuperscript{108} while for Rooke and Buller JJ, it was an elementary truth of the arts and sciences.\textsuperscript{109} Heath J was alone in taking the view that the prohibition on patenting ‘principles’ extends to preclude patenting methods of production and even patents on the application of a principle.\textsuperscript{110}

On the physicality front, the involvement of some physical substance was for Heath and Buller JJ the basis for determining whether the invention is an abstract principle or patentable subject matter. According to Heath J, the term ‘manufacture’ is reducible to two classes: vendible machines or (chemical) substances,\textsuperscript{111} both of which are objects of definite physical form. For Heath J, unless the method resulted in a vendible machine or substance, a patent could not be supported, and if it did so result, the patent would be for the vendible machine or substance and not the method itself.\textsuperscript{112} By way of example, his Honour regarded ‘patents for chemical processes’ as

\begin{itemize}
\item \textsuperscript{106} Ibid 668.
\item \textsuperscript{107} Ibid 667 (Eyre CJ).
\item \textsuperscript{108} Ibid.
\item \textsuperscript{109} Ibid 659 (Rooke J), 662 (Buller J).
\item \textsuperscript{110} Ibid 661 (Heath J).
\item \textsuperscript{111} Ibid 660-1.
\item \textsuperscript{112} Ibid 661.
\end{itemize}
being in truth ‘for a vendible substance’. \(^{113}\) In a similar fashion, but excluding the requirement for vendibility, Buller J agreed, limiting patentability to mechanical and chemical forms. \(^{114}\) Both Heath and Buller JJ, whose views would not accommodate the patentability of processes that make use of an existing engine, found the patent to be invalid. \(^{115}\)

In contrast, Eyre CJ considered that the expression ‘any manner of new manufacture’ bore a much wider meaning. The Chief Justice held that it would apply to things made, the practice of making (thereby endorsing the patentability of processes generally), and principles reduced to practice in a new manner (thereby endorsing the patentability of non-physical processes). \(^{116}\)

It was admitted in the argument at the Bar, that the word manufacture in the statute was of extensive signification, that it applied not only to things made, but to the practice of making, to principles carried into practice in a new manner, to new results of principles carried into practice. Let us pursue this admission. Under things made, we may class, in the first place, new compositions of things, such as manufactures in the most ordinary sense of the word; secondly, all mechanical inventions, whether made to produce old or new effects, for a new piece of mechanism is certainly a thing made. Under the practice of making we may class all new artificial manners of operating with the hand, or with instruments in common use, new processes in any art producing effects useful to the public. \(^{117}\)

Eyre CJ noted that a patent for a method involving no new mechanism and producing no new result would necessarily be for the method itself, that is, for the ‘method

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\(^{113}\) Ibid.

\(^{114}\) Ibid 662-3.

\(^{115}\) Ibid 660-1 (Health J), 664-5 (Buller J).

\(^{116}\) Ibid 666. See also 667, at which Eyre CJ regarded the view that methods of production were unpatentable as contradicted by the evidence in the patents granted since 1623, ‘three-fourths’ of which were likely to have been for methods of operating and manufacture ‘producing no new substances and employing no new machinery.’).

\(^{117}\) Ibid 666. See also 667, at which Eyre CJ regarded the view that methods of production were unpatentable as contradicted by the evidence in the patents granted since 1623, ‘three-fourths’ of which were likely to have been for methods of operating and manufacture ‘producing no new substances and employing no new machinery.’).
detached from all physical existence whatever’. He endorsed the view that abstract principles are not patentable and drew a connection between patentable subject matter and physical or corporeal objects or substances.

Undoubtedly, there can be no patent for a mere principle, but for a principle so far embodied and connected with corporeal substances as to be in a condition to act, and to produce effects in any art, trade, mystery, or manual occupation, I think there may be a patent.

Although the focus of his Honour’s judgment is upon mechanical and chemical devices and methods, there is nothing to indicate that he considered the concept to be limited to those objects. Indeed, his Honour’s explanation of patentable processes (‘the practice of making’) was so broad as to include ‘any art producing effects useful to the public’. The extent of the Chief Justice’s reasoning in this regard is that processes involving principles embodied in physical or corporeal objects or substances are patentable subject matter, rather than abstract ideas. This however, does not mean his Honour contemplated that patent eligibility was so limited. There is nothing in his reasoning that indicates that non-physical processes are necessarily abstract ideas or principles, or that non-physical processes are for any other reason excluded from patentability. At no stage did his Honour attempt to explain exhaustively what an abstract idea or principle is, other than to say that reduction to practice is what distinguishes an abstract idea or principle from a patentable process.

Accordingly, his Honour’s view cannot be interpreted as favouring a physicality requirement. In fact, there is nothing to suggest that his Honour contemplated the exclusion of non-physical inventions from patentability. Instead, both the Chief Justice and Rooke J indicated that patent eligibility turns on a principle being reduced to a specific practical application capable of producing effects that are of benefit to the public. This is a position, which is as true today as it was then, that leaves open

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118 Ibid 667.
119 Ibid 666.
120 Ibid 666.
121 Ibid 667.
122 Ibid 659-660 (Rooke J), 668 (Eyre CJ).
the possibility that non-physical inventions have being recognised as being patent eligible since the earliest judicial consideration of the ‘manner of new manufacture’ standard.

Rooke J saw no difficulty with process patents or patents to improvements on existing technologies. By focusing on the mechanical nature of the improvement, he allowed the patent, having determined that the invention claimed is more than a mere principle. Rather, Rooke J considered the claimed invention to be a principle reduced to a practical application. His Honour said nothing to indicate that producing a physical effect or causing a physical transformation of matter is what distinguishes the abstract from the non-abstract.

The issue in Boulton and Watt v Bull was re-litigated four years later in Hornblower v Boulton. There the court found in favour of the patentee and upheld the reasons and decision of Eyre CJ. In that case Kenyon LCJ defined ‘manufacture’ as meaning ‘something made by the hands of man’. Grose J agreed, finding that ‘Mr. Watt had invented a method of lessening the consumption of steam and fuel in [steam] engines’, and this was ‘not a patent for a mere principle, but for the working and making of a new manufacture within the words and meaning of the statute’.

Despite the finding in Hornblower v Boulton, it is widely accepted that it was not until 1842 that it was finally settled in Crane v Price, that the term ‘manufacture’ used in the Statute of Monopolies is used in a dual sense, which comprehends both a process and a product.

2 The King v Wheeler

123 Ibid 659.
124 Ibid 659-660.
125 (1799) 8 TR 95; 101 ER 1285 (KB).
126 Ibid 1288 (Kenyon LCJ).
127 Ibid 1290-1291 (Grose J). Watt’s steam engine patent was extended for 25 years by an Act of Parliament in 1775: 15 Geo. III c. 61: An Act for vesting in James Watt, engineer, his executors, administrators, and assigns, the sole use and property of certain steam engines, commonly called fire engines, of his invention, described in the said Act throughout His Majesty's dominions, for a limited time.
128 (1842) 1 Web PC 393; 4 Man & G 580; 134 ER 239.
The distinction between patentable manufactures and unpatentable ‘principles’ articulated in *Boulton and Watt v Bull* and *Hornblower v Boulton* was confirmed in the nineteenth century in *The King v Wheeler*. The patent considered in *The King v Wheeler* concerned a new method of drying and preparing malt. It was controversial because no new machine was involved. The patent in question was declared void on the ground that the specification did not adequately describe the claimed invention.

In the course of giving judgment for the court, Abbott CJ described the concept of manufacture in the following terms.

Now the word ‘manufactures’ has been generally understood to denote either a thing made, which is useful for its own sake, and vendible as such, as a medicine, a stove, a telescope, and many others, or to mean an engine or instrument, or some part of an engine or instrument, to be employed, either in the making of some previously known article, or in some other useful purpose, as a stocking frame, or a steam engine for raising water for mines. Or it may perhaps extend also to a new process to be carried on by known implements, or elements, acting upon known substances, and ultimately producing some other known substance, but producing it in a cheaper or more expeditious manner, or of a better and more useful kind. But no merely philosophical or abstract principle can answer to the word ‘manufactures’. Something of a corporeal and substantial nature, something that can be made by man from the matters subjected to his art and skill, or at the least of some new mode of employing practically his art and skill, is requisite to satisfy this word.

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129 (1819) 2 B & Ald 345; 106 ER 392. For further nineteenth century consideration of the distinction between a patentable invention and an abstract principle, see *Househill Iron Co v Neilson* (1843) 1 Web Pat Cas 673 (HL) where the House of Lords confirmed the approach taken by Alderson B in *Jupe v Pratt* (1837) 1 Web Pat Cas 145 (Ex) that all abstract principles may be patentable, subject to their having been directed to a practical application. The House of Lords drew a distinction between an abstract principle and the same principle when connected with some ‘special purpose or practical operation’, which was capable of supporting a patent. Only when an abstract principle had been ‘clothed with the language of practical application’ could it be regarded as ‘an invention, in the patent law sense of the term’.

130 Ibid 351-2.

131 *The King v Wheeler* (1819) 2 B & Ald 345, 349; 106 ER 392, 394-395.
From this statement it is clear that his Honour considered new physical objects and physically transformative processes as the basis of what has been ‘generally understood’ to constitute patentable subject matter. However, as with Eyre CJ in *Boulton and Watt v Bull*, it cannot be said that he saw the involvement of a physical substance as being a prerequisite to patentability.

In this respect, his Honour considered the distinction between patentable subject matter and an unpatentable ‘philosophical or abstract principle’ as involving something broader than a physicality requirement. In the quote above, his Honour gave three distinct examples of patentable subject matter, namely, ‘Something of a corporeal and substantial nature’, ‘something that can be made by man from the matters subjected to his art and skill’ and ‘or at the least of some new mode of employing practically his art and skill’. By his Honour’s use of the conjunction ‘or’ it is clear that these three examples are alternatives, rather than an aggregate. It is the inclusion of the last of these examples which indicates that his Honour considered that the concept of manufacture might extend beyond things of ‘corporeal and substantial nature’ such as processes devoid of physical elements.

3 Cooper’s Application

*Re Cooper’s Application for a Patent (Cooper’s Application)* involved a patent application for an improved form of newspaper featuring a blank space along which the page could be folded to avoid the trouble of reading over the folded part of the paper.

In allowing an appeal from a decision of the Comptroller-General below, the Attorney-General Sir Robert Finlay ruled that the invention is patentable subject matter because it involves an ‘invention with reference to a manufacture’ that results in ‘a material product of some substantial character’. The Attorney-General approved the Comptroller’s direction that:

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132 Ibid.
133 (1901) 19 RPC 53 (AG).
134 Ibid 54.
135 Ibid.
A Patent may be properly refused in any case in which no material product of a substantial character is realised or effected by the alleged invention, or in which the only material product is a printed sheet, or its equivalent, and the only alleged invention an arrangement of words, or the like, upon such sheet.\textsuperscript{136}

In response to this direction, he distinguished a manufacture resulting in a material product from what might be described today as an unpatentable abstract business idea.

You cannot have a Patent for a mere scheme or plan – a plan for becoming rich; a plan for the better Government of a State; a plan for the efficient conduct of business. The subject with reference to which you must apply for a Patent must be one which results in a material product of some substantial character. The specification must show how some such material product is to be realised or effected by the alleged invention.\textsuperscript{137}

He then said that a patent might be properly refused if:

the case is one in which the only material product is a printed sheet, or its equivalent, and the only alleged invention an arrangement of words or the like upon such sheet.\textsuperscript{138}

However, he held that the application before him was of a different kind, being more than just a literary arrangement of words on a page.

The present Applicant in no way proposes to arrange printed matter for its more convenient use from a literary point of view. What he proposes is a particular way of manufacturing a newspaper; and the alleged utility of his supposed invention is purely mechanical. It in no way is analogous to the arrangement of an index, or the arrangement of any other production of a literary kind, which

\textsuperscript{136} Ibid. For a statement as to the correctness of the Attorney-General’s quotation see \textit{Re an Application for a Patent by Fishburn (Fishburn’s Application)} (1938) 57 RPC 245, 246-247 (PAT) (which involved a patent being allowed for an invention that consisted of arranging information on each end of a cinema ticket so that it could be torn in half).

\textsuperscript{137} \textit{Re Cooper’s Application for a Patent (Cooper’s Application)} (1901) 19 RPC 53, 54.

\textsuperscript{138} Ibid.
Physical Effect in Patent Law

may enable the reader more readily to appreciate the sense of the author.  

Thus, he focussed on the fact that ‘the alleged utility of [the] supposed invention is purely mechanical’.  

He described the invention as a new type of newspaper, which is clearly a physical article of manufacture and an artificial product.  

The Attorney-General pointed out that he did not see any difference between this new form of newspaper and ‘a proposal for so binding a book that it opens comfortably and conveniently for the reader’ so as to make it ‘physically more convenient for use’.  

The Attorney-General’s judgment contains three statements of legal principle. The first is a general exclusion of abstract plans and schemes from patentability. The second is that excluded from patentability are processes not involving something ‘which results in a material product of some substantial character’.  

The third is that an alleged invention will be patentable if it is something of a mechanical nature.  

Given that the word ‘material’ comes from the Latin ‘materia’, meaning matter, it could be that by his reference to the need for a ‘material product’, the Attorney-General was in favour of a physicality requirement.  

This view is supported by Pila, who contends that he saw the concept of manufacture as something that requires ‘the production of a physical artificial object’.  

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139 Ibid 54-55.  
140 Ibid 54.  
141 Ibid 55.  
142 Ibid.  
143 Ibid 54.  
144 Pila, ‘Inherent Patentability in Anglo-Australian Law’, above n 17, 135. According to Pila (at n 210), the view expressed by the Attorney-General in Cooper’s Application was consistently confirmed in subsequent cases heard prior to 1959. In her view, demonstrative of this sort of alleged invention is Re an Application for a Patent by W (1914) 31 RPC 141 (‘W’s Application’) which involved a manner of use of buoys for navigation purposes, the position and markings on the buoys enabling the navigator to determine exactly where the ship was relative to certain fixed points. This system was held to be nothing more than so fixing the buoys that they showed by their relative position and markings where they were. It was held at 142 that this system could not be considered a manner of new manufacture within the Act because ‘mere systems, more convenient methods of arranging well-known objects so that you may have them handy for reference’ are inherently unpatentable. W’s Application is to be contrasted with Loth’s Application (1942) 41 RPC 273. In Loth’s Application there was claimed a combination of elements, a cable laid on the sea or river bed carrying an electric current, frames on the outside of the vessel, and crossed frames at the centre line of the vessel. By these means the ship’s navigator could tell exactly where the ship was with respect to the cable. Sir Henry Slessor, SG, in contrasting this arrangement with that of W’s Application which was ‘mere notative indications on the buoys, said, [h]ere you have a specific invention depending upon the specific discovery of the form of the field of electric force finding expression in a specific complex of apparatus for the detection of that force’. See also Re Johnson’s Application for a Patent (Johnson) (1901) 19 RPC 56, 56 (SG) (‘systems
alternative is that ‘a material product of some substantial character’ merely indicates that something other than an abstract principle is required. Given the ambiguity that exists, it cannot be said one way of the other whether the Attorney-General was in favour of a physicality requirement.

4 Rogers v The Commissioner of Patents

Rogers v The Commissioner of Patents,145 is an example of the tensions that exist between narrow conceptions regarding the patentability of methods and the emergence of contemporary notions of broad subject matter. The case involved a method of burning timber by causing a self-feeding slow fire to act continuously against the side of a tree.

of business’ were deemed inherently unpatentable, even where their implementation requires the use of a printed envelope with a particular arrangement of words thereon); Re Ward’s Application for a Patent (Ward’s Application) (1911) 29 RPC 79, 79 (SG) (in refusing an application for a method of indexing Sir John Simon, SG, said ‘... you may rightly patent that which, when the invention is applied, produces an article of manufacture, the novelty of which consists in the manufacture, on the other hand you cannot of course patent an idea or scheme or a mere method’); Re an Application for a Patent by W (W’s Application) (1914) 31 RPC 141, 142-142 (SG); Re an Application for a Patent by C (C’s Application) (1919) 37 RPC 247 (SG) (‘system of writing such as a system of shorthand’ inherently unpatentable); Re an Application for a Patent by F (F’s Application) (1920) 37 RPC 112, 113 (SG) (‘scheme whereby those in authority and in command of destroyers and submarines or both are to have some control exercised over the powers which they possess, and which they ought to use under, and which must be left to, their own judgment’ inherently unpatentable); Re an Application for a Patent by A E W (A E W’s Application) (1924) 41 RPC 529, 529-530 (SG) (‘colouring or … other method of indication on an odometer wheel’ effecting a ‘plan or scheme for reminding the driver that attention is required’ inherently unpatentable); Re an Application for a Patent by D A and K (D A and K’s Application) (SG) (1925) 43 RPC 154, 158 (plan for using confectioners’ ordinary stock in trade inherently unpatentable); Re an Application for a Patent by James Yate Johnson (Johnson’s Application) (1930) 47 RPC 361, 364 (SG) (‘distinctive colour mark of origin of … goods, having a trade mark value’ inherently unpatentable); Re an Application for a Patent by Littlewoods Mail Order Stores Ltd (Littlewoods Application) (1954) 71 RPC 185, 189 (SE) (plans for the conduct of business inherently unpatentable); Re Brown (1899) 5 ALR 81 (VSC) (invalidating a patent for ‘an improved method of preventing the fraudulent re-use of sales book dockets, and books for use in connection therewith’ on the ground that, whilst ingenious, the method amounted to a mere working direction as to how to use the dockets to avoid a possible fraud, which improved the dockets but not in a manner capable of supporting a patent). Pila also cited two early cases which effectively preempted modern decisions which found that there is no business method exception to patentability, namely: Fishburn’s Application (1938) 57 RPC 245, 248 (finding that whilst a ‘“mere” scheme or plan” is inherently unpatentable, an alleged invention does not become such a scheme or plan merely because the mechanical purpose it serves is a purpose that has useful results in the carrying on of a branch of business); Re an Application for a Patent by Cobianchi (Cobianchi UK) (1953) 70 RPC 199, 200 (PAT) (finding a collocation of playing cards to be more than a mere ‘idea or plan’ by virtue of its possession of ‘something more than the sum of its individual parts’, and to be inherently patentable as a combination, despite the fact that the thing in question was ‘but a potentiality which requires for its translation into actuality not only the full collection of the parts but a conception or plan for their use, for example, a card game’).

145 (1910) 10 CLR 701 (Griffith CJ and O’Connor J, and Isaacs J dissenting).
The High Court by majority denied the patent, seemingly on the basis that it considered the invention to be trivial. Griffith CJ was of the view that the patent ought to be denied because the method claimed is merely ‘a direction how best to use materials in everyday use to achieve an everyday object’.\textsuperscript{146} O’Connor J objected to the patent on the basis that he considered that it produced nothing new. In his view, the result of the process is that ‘no machine is made—nothing is invented, nothing is produced’\textsuperscript{147} and that is absurd to describe an improved method of building a log fire as a patentable invention.\textsuperscript{148} O’Connor J was seemingly of the view that the law requires that an invention disclose a physical aspect to be regarded as patentable.\textsuperscript{149}

The decision, however, is of interest because it contains the strong dissent of Isaacs J, who rejected the majority’s conception of patentable subject matter and took the view that the ingenuity of the method claimed in conjunction with its economic and practical significance made it patentable subject matter.\textsuperscript{150}

In doing so, his Honour dispelled any notion that an invention might not be deserving of a patent on subject matter grounds without having recourse to its novelty on the suggestion that what is claimed is an ‘attempt to claim an every day practice’.

Why is this contrivance not of the nature of an invention? Why is it to be treated as if it were an absurd attempt to claim an every day practice, say of lighting the kitchen fire, or striking a match? ... It involves an idea, and a modus operandi... It is objected that to grant Rogers a patent for this would prevent a land owner from adopting the expedient. If this is an objection a great proportion of the patents in existence should never have been granted. ... The mere fact of simplicity, and that the expedient looks obvious now to those

\textsuperscript{146} Ibid 709 (Griffiths CJ).
\textsuperscript{147} Ibid 710 (O’Connor J).
\textsuperscript{148} Ibid 712 (O’Connor J).
\textsuperscript{149} Ibid (“The proposition that a patent may be granted for a new method of producing an old result in a more efficient and more economical manner must therefore be qualified by the condition that the new method must either produce some vendible article or must be carried out by some mechanical contrivance or some substance the use or adaptation of which for the purpose of working the new method is part of the invention.”).
\textsuperscript{150} Ibid 718 (Isaacs J) (dissent).
who have become acquainted with it for the first time, does not destroy its inventive character.\textsuperscript{151}

It would appear that his Honour was aware of the significance of the majority’s narrow conception of the patentable subject matter standard when he said, ‘the principle upon which this case is decided appears to me to affect not merely the present and future applications, but also the possible validity of many existing patents.’\textsuperscript{152}

His Honour’s dissent arguably brought to light new thinking about the patent system and its ability to reach into what might be thought to be everyday activities that would later be adopted by the courts, namely that the focus of the patentable subject matter inquiry is on new and ingenious subject matter, rather than physically observable results.\textsuperscript{153}

5  \textit{Re C & W’s Application}

\textit{Re C & W’s Application},\textsuperscript{154} was the first case in which a medical procedure patent was considered in England. It concerned a method of extracting lead from people suffering lead poisoning.

The Solicitor-General, Sir Stanley Buckmaster SG, held that the method was ineligible for patent protection because he believed that it did not involve the manufacture or sale of a ‘commercial product’ or something of ‘commercial value’.\textsuperscript{155}

A manner of new manufacture may be something newly made, or a substance which, if made before, is improved in its manufacture; or, quite apart from

\begin{footnotesize}
\begin{enumerate}
\item Ibid.
\item Ibid.
\item See also \textit{Commissioner of Patents v Lee} (1913) 16 CLR 138 (Isaacs J).
\item (1914) 31 RPC 235 (SG).
\item Ibid 235-236.
\end{enumerate}
\end{footnotesize}
that, it may be a machine or a process that can be used in making something that is, or may be, of commercial value.\textsuperscript{156}

Rather than focussing on a physicality requirement, the Solicitor-General was concerned only that an invention be ‘in some way associated with commerce and trade.’\textsuperscript{157} It is arguable that by his use of the word ‘may’, he viewed patentable subject matter as being of broad compass. While the words, ‘something newly made’ and ‘substance’ indicate a reference to physical objects, the use of the word ‘may’ indicates that the Solicitor-General merely gave examples of patentable subject matter, rather than a hard-and-fast rule.

The Solicitor-General did not consider that policy arguments against the patenting of methods of treating the human body ought to affect the decision in a case such as this. It has been urged, and I think quite rightly, that the question of humanity ought not to affect the decision in such a case as this. I agree. Of course, it is well known that the medical procession do all in their power to discourage members of their body from obtaining protection for any discovery that has for its object the alleviation of human suffering, and it is impossible to speak too highly of such conduct, but it cannot affect my judgment in arriving at a conclusion upon the terms of the Section of the Act of Parliament, and I have altogether excluded such considerations from my mind.\textsuperscript{158}

However, in the Solicitor-General’s opinion, the fact that a human being could be considered to be something that could be improved by the method did not make it one ‘of manufacture or of trade’, even though a human may be a better working organism when a poisonous quantity of lead is extracted.\textsuperscript{159} Although, he thought that if the

\textsuperscript{156} Ibid.
\textsuperscript{157} Ibid 235.
\textsuperscript{158} Ibid; cf Schering AG’s Application [1971] RPC 337 (PAT) (in which Graham and Whitford JJ expressed as obiter an opinion that the decision in Re C & W’s Application was correct, but held that a contraceptive process could not be described as a treatment of disease and thus the claim fell outside the prohibition on patenting methods of medical treatment of humans). See also A & H’s Application (1927) 44 RPC 298, 298 (SG) (dealing with the patentability of a contraceptive device) (‘I am a Court of Law, and not a Court of Morality’).
\textsuperscript{159} Ibid 236. The Solicitor-General’s reasoning in this regard is now seen as being too narrow after the High Court’s NRDC decision: Anaesthetic Supplies Pty Limited v Rescare Limited (1994) 122 ALR
process were applied ‘for the purpose of removing lead from animals in order to make them better marketable products, it might be that different considerations would apply’. Arguably, the Solicitor-General here confused the vendibility of the subject of the process with the vendibility of the process itself.

In any event, regardless of the propriety of the exception to patent eligibility of methods of medical treatment of humans, the Solicitor-General’s opinion does seem to support the absence of a physicality requirement in favour of an association with ‘commerce and trade.’

6 Maeder v Busch

In Maeder v Busch, the High Court of Australia considered a patent for a cosmetic method of treating the human body to cause a permanent waving of human hair. The method was rejected for want of novelty by reason of prior common knowledge and prior public use, in accordance with the trial judge’s findings. None of the judges hearing the case considered that the issue of whether the subject matter of the invention was patentable was one that needed to be decided.

Despite this, the decision contains obiter dicta of Dixon J on the manner of manufacture issue. His Honour made known his opinion that the result of a patented method must be the production, treatment of, or effect upon, some tangible thing.

Applications of old things to a new use, accompanied by the exercise of inventive power, are often patentable though there be no production of a new thing. But in every case the invention must refer to and be applicable to a tangible thing. A disembodied idea is not patentable.

141; Bristol-Myers Squibb Co v FH Faulding & Co Ltd [2000] FCA 316, [114], [130]-[131] (Finkelstein J).

160 Ibid.


162 Ibid 699 (Latham CJ), 699-700 (Dixon J), 707 (Evatt J), 708 (McTiernan J).

163 Ibid 699 (Latham CJ), 707 (Dixon J), 707 (Evatt J), 708 (McTiernan J).

164 Ibid 705 citing Edmunds and Bentwich, Copyright in Designs (1908, 2nd ed) 20, 21 (citations omitted).
In applying the law to the patent at hand, Dixon J put the question, ‘Can the discovery or improvisation of a mere process or method of treating any corporeal part of the human being afford subject matter for a patent?’\(^{165}\) While his Honour left this question unanswered, he did explain the arguments in favour of distinguishing treatment of the human body for an increase in ‘pride or appearance’ say ‘for use in ordinary trade or business such as that of hairdressing, manicure, pedicure’, and surgical methods to improve ‘physical welfare’. He hinted that the first would be patentable subject matter as they reflect a manual art or craft even though no ‘substance or thing forming a possible subject of commerce or a contribution to the productive arts is to be brought into existence by means of or with the aid of the process’. He ruled, following \textit{Re C & W’s Application}, that the second would not be patentable as they were thought to be essentially non-economic.\(^{166}\)

7 \textit{Fishburn’s Application}

\textit{Re an Application for a Patent by Fishburn (Fishburn’s Application)}\(^{167}\) is an early case that pre-empted the modern decisions refuting the business method exception to patentability.\(^{168}\)

The case concerned a patent entitled, ‘Improvements related to tickets and the like.’ It involved the design of a printed ticket in such a way as to be capable of being divided into at least two portions, either transversely or longitudinally, such that each portion would bear all the essential printed information of the ticket including an identifying serial number. This design would allow a doorman or a machine to tear the ticket in half and return one half to the ticket holder and retain the other, leaving both parties with ticket stubs that contain all the essential information.

\(^{165}\) Ibid 705.
\(^{166}\) Ibid 706-707 citing \textit{Re C & W’s Application} (1914) 31 RPC 235.
\(^{167}\) (1938) 57 RPC 245 (PAT) (Morton J).
\(^{168}\) The business method exception to patentability was rejected in the United States in \textit{State Street Bank & Trust Co. v Signature Financial Group, Inc.}, 149 F.3d 1368, 1375 (Fed. Cir. 1998) aff’d in \textit{AT&T Corp v Excel Communications, Inc}, 172 F.3d 1352 (Fed. Cir. 1999) and \textit{In re Bilski}, 545 F.3d 943, 960 (Fed. Cir. 2008) (en banc). The \textit{State Street} decision was followed and its ‘useful, concrete and tangible result’ test was endorsed by the Federal Court of Australia in \textit{Welcome Real-Time SA v Cattupty} [2001] FCA 445, [125]-[126] (Heerey J) and \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [26].
In reaching the conclusion that the ticket design is patentable subject matter, Morton J held, in respect of printed matter, that Sir Robert Finlay’s judgment in *Cooper’s Application*:

should not be read as a direction that a patent should be refused in every case in which the only material product is a printed sheet, ticket, coupon, or its equivalent and the only alleged invention is an arrangement of words or the like upon that sheet.\(^{169}\)

In his Honour’s opinion, the decisive factor was that the alleged invention served a ‘mechanical purpose’ and it did not lose this character merely because it had utility in carrying on a business.\(^{170}\) He indicated that while a mere scheme or plan is inherently unpatentable, an alleged invention is not a mere scheme or plan merely because the mechanical purpose it serves has useful results when used in connection with a business.\(^{171}\)

Given that Morton J relied heavily on the decision in *Cooper’s Application* and did not specifically mention physicality as an issue, no firm conclusions can be drawn from this opinion as to his Honour’s views on the issue.

8  *Re GEC’s Application*

However, his Honour’s views were quite apparent in *Re GEC’s Application*.\(^{172}\) In *Re GEC’s Application*, Morton J upheld an opposition to a patent for a method of extinguishing fires using a known chemical substance because he did not consider that its application would result in the production, improvement, restoration or preservation of some ‘vendible product’.

Morton J sought to create a convenient formula for describing the ‘manner of manufacture’ concept. While not claiming to lay down a hard and fast rule applicable to all cases, his Honour made the oft-cited proposition, known now as Morton J’s

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\(^{169}\) *Re an Application for a Patent by Fishburn (Fishburn’s Application)* (1938) 57 RPC 245, 246.

\(^{170}\) Ibid 247-248.

\(^{171}\) Ibid.

\(^{172}\) (1942) 60 RPC 1 (Morton J).
rule. Morton J’s rule is that a method or process will be a manufacture if it: (i) results in the production of some vendible product; or (ii) improves or restores to its former condition a vendible product; or (iii) has the effect of preserving from deterioration some vendible product to which it is applied.\textsuperscript{173}

In regard to whether his Honour favoured a physicality requirement, as his Honour did not claim to lay down a hard and fast rule, it could be said that he was giving only an indication of the scope patent eligible subject matter. While this formulation is a useful starting point, it has been said that if were applied literally, it would have a narrowing effect on the law, as was acknowledged in the cases that followed.\textsuperscript{174} The narrow focus of Morton J’s rule is now considered by the High Court of Australia in \textit{NRDC} as having been substantially qualified by the comments made in relation to it by Evershed J in \textit{Re Two Applications for Patents by The Cementation Company, Limited (The Cementation Company’s Application)} and in \textit{Re an Application for a Patent by Henry Barnato Rantzen (Re Rantzen’s Application)}, and by Lloyd-Jacob J in \textit{Re Elton and Leda Chemicals Ltd’s Application}.\textsuperscript{175}

9 \textit{The Cementation Company’s Application}

In \textit{Re Two Applications for Patents by The Cementation Company, Limited (The Cementation Company’s Application)},\textsuperscript{176} processes for treating a stratum of subterranean soil to prevent subterranean combustion by drilling holes in the ground and injecting certain chemical substances into them were held to be patentable.\textsuperscript{177}

In allowing the patent, Evershed J was careful not to confer upon Morton J’s rule anything near the narrow construction a literal interpretation of its words would give. He observed that Morton J had not intended to create a form of words applicable in all cases.\textsuperscript{178} He also noted that Morton J had not intended to limit the understanding

\textsuperscript{173} Ibid 4.
\textsuperscript{174} \textit{National Research Development Corporation v Commissioner of Patents} (1959) 102 CLR 252, 276.
\textsuperscript{175} Ibid.
\textsuperscript{176} (1945) 62 RPC 151 (PAT).
\textsuperscript{177} Ibid 151 (‘the process consists of a method of treating a subterranean formation containing material liable to combustion so as to prevent the occurrence of such combustion.’).
\textsuperscript{178} Ibid 153. Evershed J, referring to Morton J, commented that ‘nothing was further from his intention than to lay down a rigid form of words which would govern—in substitution, as it were, for the language of the Act of Parliament—the grant of protection in all cases of methods or processes.’
of ‘product’ that results from a ‘manufacture’ to its common meaning, but that it should be construed much more broadly. Making reference to the Oxford Dictionary, Evershed J thought that the term ‘product’ is wide enough to encompass ‘that which is produced by any action, operation or work: a production; the result.’\footnote{179}

Evershed J also observed that Morton J directed his attention to whether, and to what extent, the manner of manufacture concept extends to processes not resulting in the creation of some new articles or material which did not previously exist; and that the emphasis in Morton J’s rule was upon the three activities of production, improvement or restoration, and prevention from deterioration. Evershed J noted that Morton J used the word ‘product’ in a sense which denoted the subject matter of each of the three forms of activity referred to, rather than placing any emphasis on the literal meaning of the particular words he used.\footnote{180}

In keeping with his view that patentable subject matter should be interpreted broadly, Evershed J was careful that the applicant should be given the benefit of the doubt in contentious cases in which the patentability of subject matter is in issue. In allowing the patent, he said, ‘it cannot be asserted that… [the subject matter of the application] is beyond reasonable doubt not a “product” within the terms’ of Morton J’s rule.\footnote{181} Thus, his Honour clearly envisaged a broad compass of patentable subject matter and that the critical test for denying a patent should lie within establishing that the invention is new. While he did not say so directly, or even consider the issue, such a broad view would be consistent with the view that the scope of patentable subject matter is not limited to inventions that produce a physical effect or cause a physical transformation of matter.

10 Re Rantzen’s Application

\footnote{179} Ibid.
\footnote{180} Ibid 154.
\footnote{181} Ibid. This is consistent with the view taken by the High Court of Australia in Commissioner of Patents v Microcell Ltd (1959) 102 CLR 232, 244-245, in which it decided that the Commissioner ought not refuse an application unless it appears practically certain that a patent granted would be held invalid.
In *Re an Application for a Patent by Henry Barnato Rantzen (Rantzen’s Application)*, Evershed J allowed a claim to a method of producing a complex electrical oscillation on the ground that it would not be right to hold that an electrical oscillation is not a vendible product. This is a purely non-physical invention. The only ‘thing’ affected is electrical energy when transmitted by wire or wirelessly.

His Honour noted the difficulty of considering electricity as a ‘product’, given its intangibility and lack of ‘material content’ and that its transmission does not require any ‘material media’, as the oscillation does not require a movement or vibration of a medium. It only requires the variation in the momentary voltage from a positive to negative charge.

Notwithstanding this difficulty, Evershed J interpreted Morton J’s use of the word ‘product’ as being wide enough to corporate electrical energy, despite its non-material character, because of its analogy in commercial respects with material commodities. Evershed J said that where he spoke of a ‘vendible product’ the proper emphasis of such an expression lies upon the trading or industrial character, rather than physical or material character, which he regarded as not essential.

I conclude, therefore, that it would not be right, nor, as I think, in accordance with Morton, J’s intention, to give to the term “vendible product” a narrow or rigid construction by placing undue emphasis on the material requirements of what may otherwise fairly be regarded as the outcome of a process of manufacture.

His Honour held that the notion of a ‘vendible product’ is not confined to things that can be passed from one to another upon a transaction of purchase or sale, but rather

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182 (1946) 64 RPC 63 (PAT).
183 Ibid 67. See also *The Electric Telegraph Co v Brett* (1851) 10 CB 838; 138 ER 331 (a method of giving duplicate electric signals) and *Re Philips Electrical Industries Ltd’s Application for a Patent* [1959] RPC 341 (HCJ) (treating visible light as a ‘product’). This decision is clearly inconsistent with the majority’s opinion in the United States Federal Circuit decision in *In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007). It is, however, arguably consistent with the dissent expressed by Linn J in that case.
184 *Re Rantzen’s Application* (1946) 64 RPC 63, 66.
185 Ibid. See also the use of the expression, ‘industrial or commercial or trading character’ by Lloyd-Jacob J in *Re Lenard’s Application* (1954) 71 RPC 190, 192.
186 Ibid.
encompasses anything that might ‘fairly be regarded as the outcome of a process of manufacture’.\textsuperscript{187} Thus, his Honour said:

Nor, when regard is had to everyday usage and terminology, can it be said that the notion of electricity as a product which is paid for is, however metaphorical, wholly inappropriate and insensible.\textsuperscript{188}

Thus, Evershed J held that the method of producing a complex electrical oscillation is indeed a manufacture, in spite of its non-physical nature.

\textbf{11 Re An Application for a Patent by Bovingdon}

\textit{Re an Application for a Patent by Bovingdon (‘Bovingdon’s Application’)}\textsuperscript{189} involved a method of fumigating enclosed spaces to control pests by forming a film of insecticide on the walls and other articles located within the space that would cause the destruction of insects and other pests therein.

In a curious decision that is difficult to reconcile with his earlier opinions in \textit{The Cementation Company’s Application} and \textit{Rantzen’s Application}, Evershed J took a narrow literal construction of Morton’s rule and determined that the invention at issue needed to fit within one the branches of that rule, being whether the method improves or protects from deterioration some product. His Honour held that this invention did not. Accordingly he found it not be a manner of new manufacture. Evershed J held that such a method did not involve an ‘alteration in the structure of the enclosing walls of the space or of the articles within it; so that it may be said, within the phrasing of the well known \textit{GEC case}, that it improves or protects from deterioration … some “product”’.\textsuperscript{190}

In what can only be described as a short, vague and unsatisfactory judgment, his Honour said that this invention may perhaps fairly to be said to lie somewhere between the \textit{Cementation} case, on the one hand, and the \textit{G.E.C.} case, on the other’

\textsuperscript{187} Ibid.
\textsuperscript{188} Ibid 67.
\textsuperscript{189} (1946) 64 RPC 20 (PAT).
\textsuperscript{190} Ibid 21.
and that ‘the inclination is towards the latter rather than the former.’

It would appear that his Honour sought to distinguish the Cementation case on the basis that the application at issue does not result in any improvement in or alteration of the structure itself. The decisive factor for his Honour appeared to be that no substances were impregnated with the insecticide. Instead, his Honour appears to have thought that if the process had involved the impregnation of the fabric it would have been a manufacture.

Evershed J’s careless reasoning in Bovingdon’s Application was followed in Standard Oil Development Co’s Application and Re the Dow Chemical Company’s Application for a Patent, unnecessarily confusing the law. It could be inferred that his Honour’s reasoning in this case may have been responsible for the mistaken belief that patents were not available for agricultural and horticultural methods.

12 Re Standard Oil Development Co’s Application

In Re Standard Oil Development Co’s Application, a patent similar to that considered in the NRDC decision was sought for a selective herbicide used in the treatment of soil to improve its ability to bear crops. The invention involves applying to land and vegetation a herbicidal composition of stated ingredients and amount (mixed at a stated temperature) to kill the weeds, but leave the vegetables substantially unharmed in order to obtain an improved tract of substantially weed-free land.

191 Ibid 22.
192 Ibid 21-22.
193 (1951) 68 RPC 114.
195 (1951) 68 RPC 114 (Lloyd-Jacob J).
196 See also Re Lenard’s Application (1954) 71 RPC 190 (pruning to reduce mortality from disease in clove trees) and NV Philips’ Gloeilampenfabrieken Application (1954) 71 RPC 192 (a method for producing a new form of poinsettia). Both seem to depend on the view that the process in question was only one for altering the conditions of growth, so that the contemplated end result would not be a result of the process but would be ‘the inevitable result of that which is inherent in the plant’: (1954) 71 RPC 192, 194. See also BA’s Application (1915) 32 RPC 348 (the Solicitor General rejected a claim to a ‘process of fertilizing the ground consisting “in applying urea nitrate thereto” on the grounds that it was nothing but a claim to a new use of an old substance); Re the Dow Chemical Company’s Application for a Patent (1956) RPC 247; Re Canterbury Agricultural College’s Application (1958) RPC 85.
Two contentions were put forward to support the application. The first contention was that the method resulted in the production, improvement, or prevention from deterioration, of a vendible product, namely the growing crop. Lloyd-Jacob J, heavily influenced by Morton J’s formulation, disposed of this by pointing out that the treatment did not produce the crop; secondly, that while there was an improvement, it was not the crop but the cultivation that was improved, which might ultimately be reflected in the quality and condition of the crop; and thirdly, that since the only direct effect of the process was to remove weeds it did not directly preserve the crop from deterioration.\(^{197}\)

The other contention was that the process is a ‘manufacture’ because it results in a product consisting of ‘arable land treated with selective herbicides for the raising of vegetables’. In answering this, his Lordship said that the statutory requirement of a manner of manufacture is understood to be:

> the making of an article or material by physical labour or applied power. Unless and until a product of such a making is identifiable it is unnecessary to consider by what manner of making it comes into existence.\(^{198}\)

His Lordship rejected the contention, first, because the invention does not result in land being made; and secondly, because the land would remain unimproved as a result of the process.\(^{199}\) His Lordship did not consider that a process for obtaining weed-free land might be a commercially valuable vendible product.

Accordingly, Lloyd-Jacob J refused the patent, but was criticised by the High Court in *NRDC* for doing so. The High Court in this regard said the following.

> But it seems hardly sufficient to treat a case like this as if it were covered by the reasoning of *Bovingdon’s Case* (1946) 64 RPC 20 and to dismiss it by saying that, since the structure of the soil is unaffected by the killing of weeds,

\(^{197}\) Ibid 115.  
\(^{198}\) Ibid.  
\(^{199}\) Ibid 116 (‘In the present case, the land remains unaltered. Some of the herbs in or upon it are affected’, but the land is ‘merely the carrier both of crop and herbage and plays no part in the operation by which they are selectively affected.’).
the process of converting a weed-infested area into a weed-free area is not within the notion of “manufacture”. Why is it not as completely within it as the process of converting a combustible subterranean formation into a non-combustible formation, or making a building fire-proof? Once it is conceded that land may be a “product” within the sense of Morton J.’s “rule” as now understood, and that accordingly a process for improving it may be a “manufacture” in the relevant sense of the word – and Lloyd-Jacob J. did not question this – a considerable step seems to have been taken towards establishing that an artificial process for suppressing unwanted forms of growth which impede the profitable use of land may be within the concept.200

*Re Standard Oil Development Co’s Application* has been cited as authority for the proposition that an invention must involve a tangible product if it is to be a ‘manner of manufacture’.201 It would, however, appear that this is not a correct reading of the law given the more expansive view of the term ‘vendible product’ that came to be endorsed in subsequent cases beginning with *Re Elton and Leda Chemicals Ltd’s Application*, and the High Court’s criticism of the decision in *NRDC*.

13 *Re the Dow Chemical Company’s Application for a Patent*

*Re the Dow Chemical Company’s Application for a Patent*,202 concerned a similar application involving a soil sterilisation method used to prevent the growth of germinative seeds in seed-infected soils.203 The object of the treatment is to enable crops to be grown in soil. The difference between this method and the method considered in *Re Standard Oil Development Co’s Application* is that this method was designed to prevent the growth of germinative seeds, whereas the method considered in *Re Standard Oil Development Co’s Application* was designed to kill weeds while they grew.204 The argument in favour of the patent was that ‘[i]f you have a bag of

202 (1956) RPC 247 (SE).
203 Note that the term used in the judgement is indeed ‘seed-infected soils’, not seed-infested soils.
204 *Re the Dow Chemical Company's Application for a Patent* (1956) RPC 247, 251.
soil and treat it in a certain way to sterilize it you get a vendible product’ that is clearly a manner of manufacture.\textsuperscript{205}

The Superintending Examiner held the method to be unpatentable on the basis that the treatment does not alter the physical structure of the soil, but rather has the effect of rendering harmless any seeds or parasites that had infected the soil. While the soil here is the carrier of the weeds or seeds, it plays no part in the operation of the method.

The case was treated as being distinguishable from The Cementation Company’s Application for the reason that the subterranean formation in that case involves a modified or improved structure, whereas in the present case the soil itself is unchanged. It was instead likened to the applications refused in Bovingdon’s Application and Re Standard Oil Development Co’s Application. The Superintending Examiner chose these precedents because in the application in question, ‘the soil structure is unchanged’.\textsuperscript{206}

The seedicide is applied to the seed infected soil in the same way as the insecticide is applied to the insect infested buildings in Bovingdon’s Application, without in any way modifying or altering the soil apart from killing the seeds therein. The present case, to my mind, is closer to Bovingdon’s Application and Re Standard Oil Development Coy.’s Application than it is to Cementation Coy. Ld.’s Application.\textsuperscript{207}

Thus, he favoured a physicality requirement. This finding is curious given that in the method upheld in The Cementation Company’s Application the soil structure was also unchanged. This, however, is now largely academic, as the decision in Re the Dow Chemical Company’s Application for a Patent was one of those criticised and not followed by the High Court in NRDC.\textsuperscript{208}

\textsuperscript{205} Ibid 248.
\textsuperscript{206} Ibid 253
\textsuperscript{207} Ibid. Note the similarity in the reasoning to Re an Application for a Patent by Bovingdon (1946) 64 RPC 20 (PAT).
\textsuperscript{208} See National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 274 and above n 200.
14 Re Elton and Leda Chemicals Ltd’s Application

This stagnant and narrow view of manufacture was overturned in Re Elton and Leda Chemicals Ltd’s Application. This case involved a patent for a method of dispersing fog by introducing a surface-active agent in the form of a smoke or spray into the fog in order to remove or lower the electric charge carried by the surfaces of the droplets, causing them to coalesce and precipitate as rain or drizzle. The utility of the invention is in its application to produce a fog-free atmosphere, say on a runway, or to deliberately induce rainfall.

Here we have an indication that the ‘product’ referred to in Morton J’s rule, when used to denote a process, requires only something in which ‘some new and useful effect’ may be observed, rather than a physicality requirement. In considering the patent, Lloyd-Jacob J said:

There has been no question, at any rate since before the year 1800, that the expression ‘manner of manufacture’ in the Statute of James I must be construed in the sense of including a practice of making as well as the means of making and the product of making. It has thus been appreciated that, although an inventor may use no newly devised mechanism, nor produce a new substance, none the less he may, by providing some new and useful effect, appropriate for himself a patent monopoly in such improved result by covering the mode or manner by means of which his result is secured. Seeing that the promise which he offers is some new and useful effect, there must of necessity be some product whereby the validity of his promise can be tested.

Lloyd-Jacob J thus equated the term ‘vendible’ with things of commercial value, consistent with his earlier use of the expression, ‘industrial or commercial or trading character’ in Re Lenard’s Application. In this regard he said the following.

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209 (1957) RPC 267.
210 Ibid 268-269.
211 (1954) 71 RPC 190, 192 (which involved an application in respect of pruning to reduce mortality in clove trees caused by disease).
Applied with a little latitude it might afford some assistance in the present case, for a fog-free atmosphere or a deliberately induced rainfall could be a factor in the site value of the land whereon the Applicants’ process was applied. Pure air or abundant water may not by present commercial practice be vendible as such, but they may well enter indirectly into estimations of commercial value.\(^\text{212}\)

Given that the subject matter in question in this case involved the dispersion of fog, which entails a physical effect, there is only so much this decision can inform us of the need for such a requirement. What it does tell us can be sourced from the broad formulation given to the concept of ‘vendibility’ by Lloyd-Jacob J. By equating ‘vendible’ with things of commercial value, Lloyd-Jacob J indicated that the manner of manufacture concept extends beyond the bounds of material and physical constraints.

15 Virginia-Carolina Chemical Corp's Application

In *Virginia-Carolina Chemical Corp’s Application*,\(^\text{213}\) Lloyd-Jacob J explained that the presentation of information recorded in or on a physical medium is not patentable, in and of itself. His Honour made clear that any intellectual, informational or visual content attached to a physical medium lies within the realm of the ‘fine arts’ and not the ‘useful arts’, and that it is the ‘useful arts’ and not the ‘fine arts’ that patent law protects.\(^\text{214}\)

He clarified that the involvement of some physical apparatus in the presentation of information will not prevent it falling within the scope of the ‘fine arts’, unless the information itself automatically fulfils some mechanical, industrial or otherwise commercial purpose.

Even where such information is of importance in describing or defining an operation to be performed on some apparatus it cannot be regarded as part of

\(^{212}\) *Re Elton and Leda Chemicals Ltd's Application* (1957) RPC 267, 269.

\(^{213}\) [1958] RPC 35.

\(^{214}\) Ibid 36.
the performance itself and thus qualify as a manner of manufacture. If however the marks as such are described to operate through appropriate means automatically to fulfil a commercial purpose, whether the means are mechanical, optical or electrical, they can properly be regarded as an integral part of a manner of manufacture and as such fit subject matter for patent claims.\footnote{Ibid; cited in NRDC (1959) 102 CLR 252, 275.}

This case confirms the earlier precedents in Fishburn’s Application and Cooper’s Application that any presentation of information characterised solely by the content of the information has traditionally been not patentable.\footnote{See also Pitman’s Application (1969) 86 RPC 646, where an arrangement of printed words for teaching pronunciation of language was thought to have a mechanical purpose, whereas any matter having a purely intellectual, literary or artistic connotation was thought to not be patentable; and Moore Business Forms Application [1979] AOJP 2521, where a claim to a business form having printed transverse bars was allowed because the bars served the purpose of allowing the form to be printed with more lines of type per inch which would still be as easy to read as prior forms having the usual number of lines of type per inch.}

16 Rolls-Royce Limited’s Application

In Rolls-Royce Limited’s Application\footnote{[1963] RPC 251. Although it is acknowledged that this case was decided after the 1959 NRDC decision, it is convenient to position the discussion in relation to it in the section dealing with the pre-NRDC case law by virtue of the judicial approach it demonstrates, which is clearly in line with pre-NRDC thinking on the issue of patentable subject matter.} a method of operating an aircraft so as to reduce noise levels during take-off was rejected for being a mere scheme or plan. The method involved the pilot of an aircraft powered with gas turbine engines, inter alia, increasing the effective area of the final jet nozzle shortly after take-off to increase the mass overflow through the by-pass duct, thereby reducing the noise emitted by the jet nozzle. No modification of the aircraft itself resulted from the employment of the claimed method.

Lloyd-Jacob J held that this method is not patentable, being merely ‘the disclosure of a general flight plan directing the initial operational movements of an aircraft between take-off and the commencement of free-flying conditions’. He dispelled any notion that this might be patentable subject matter by saying, ‘this in my judgment is as much outside the operation of any of the useful arts as would be a trainer’s
direction to a jockey in his control of a racehorse’. The alleged invention was held to not be either a new machine or process or an old machine giving a new and improved result.

It seems that the alleged invention in *Rolls-Royce Limited’s Application* was refused because it is no more than information or instructions which could be given to a pilot on how to operate a known machine on which he might, or might not, act. One can only speculate on the significance of the comparison drawn between the claimed method and a method of instructing a jockey. This might indicate that the patent was rejected on the basis that the method was not sufficiently described or that it could not reliably be replicated time and again. That is, it consists of information that could be applied in a process involving human-decision making. Such a process cannot be guaranteed to produce stable, consistent and predictable results because of the human element involved.

Additionally, the patent was thought to be ‘generally inconvenient’ on the basis that pilots should not face the burden of concern that they may be infringing a patent monopoly while operating standard engine controls and conducting the potentially dangerous undertaking of flying.

The issue of ‘general inconvenience’ aside, it is difficult to say how his Lordship’s objection can be described. There is little emphasis on the need for a physicality requirement. The method in question does not involve a transformation of a physical object, as it involves no modification of the aircraft itself, although it does involve the use of a physical device, being an aircraft. The objection seems to be that fact that the alleged invention consists of a procedure a pilot in control of an aircraft could choose to follow, either in whole or only partially, as that person desires.

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218 Ibid 253.
219 Ibid 256.
The law relating to the concept of manufacture and the scope of patentable subject matter was consolidated by the High Court of Australia in its landmark NRDC decision in 1959.

The NRDC decision involved an appeal to the High Court challenging the rejection of a patent application by the Deputy Commissioner of Patents under the 1952 Act.\textsuperscript{220} The application was for a method of applying a herbicidal composition of known chemicals to certain broad-leafed crops to kill weeds but not harm the crops. That composition, when applied to crops, exploited differences in the enzymes that exist in crops and weeds.\textsuperscript{221} While the chemicals were known, the fact that they could be combined to effectively rid crop areas of weeds was not. The application followed a line of early 20th century cases in which patents for agricultural and horticultural methods, were consistently denied. As a result, leading into the case, it was thought that agricultural and horticultural methods were a type of invention excluded from patent-eligibility.\textsuperscript{222}

In a unanimous decision, the High Court (comprising Dixon CJ, Kitto and Windeyer JJ) declared the invention patentable. In reaching its decision, the court embraced the view that ‘manner of manufacture’ is a broad, flexible and dynamic concept, the

\textsuperscript{220} It is accepted that the NRDC decision is good law under the Patents Act (Cth) 1990, despite it having been decided under the Patents Act (Cth) 1952, as it is assumed that it was the legislature’s intent that the expression ‘manner of manufacture’ in s 18(1)(a) be construed in accordance with earlier judicial decisions involving s 6 of the Statute of Monopolies decided in accordance with the earlier statutes: NV Philips Gloeilampenfabrieken v Mirabella International Pty Ltd (1995) 183 CLR 655; CCOM v Jiejing (1994) 122 ALR 417, 446.

\textsuperscript{221} National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 260-261, 264-268. The claims at issue are set out at 260-261 and described by the court at 264-268.

\textsuperscript{222} Standard Oil Development Company’s Application (1951) 68 RPC 114; Re the Dow Chemical Company’s Application for a Patent [1956] RPC 247; Re American Chemical Paint Company’s Application [1958] RPC 47; Re an Application for a Patent by NV Philips’ Gloeilampenfabrieken (NV Philips’s Application) (1954) 71 RPC 192 (an improved method of producing poinsettias); Re Rau Gesellschaft’s Application (1935) 52 RPC 362 (a method of producing seeds having certain desired properties by selective cultivation). In Re Rau Gesellschaft’s Application, an application for a patent in respect of the production by selective cultivation of lupin seeds having certain characteristics was rejected. Luxmoore J approved a statement by the examiner that “[s]elective breeding of animals and cultivation of plants for the obtainment of improved stocks by the rigorous selection of and breeding from the few individuals which are nearest the ideal has, as is well known, been practised from the earliest times as a part of agricultural or horticultural development, as for example in the production of improved flowers or fruit with desired characteristics in the progeny, and the exercise of art or skill in these directions has not been regarded as coming within the term ‘manufacture’”.

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meaning of which has evolved over time. It said that the principles are to be applied flexibly, as technological advancement is ‘excitingly unpredictable’. Accordingly, the patentable subject matter test must be able to accommodate inventions that have not yet been envisaged and that new classes of invention presently unforeseen should not be excluded unnecessarily by a restrictive test.

The purpose of s 6, it must be remembered, was to allow the use of the prerogative to encourage national development in a field which already, in 1623, was seen to be excitingly unpredictable. To attempt to place upon the idea the fetters of an exact verbal formula could never have been sound. It would be unsound to the point of folly to attempt to do so now, when science has made such advances that the concrete applications of the notion which were familiar in 1623 can be seen to provide only the more obvious, not to say the more primitive, illustrations of the broad sweep of the concept.

The court made clear that the expression, ‘manner of manufacture,’ is not to be interpreted literally and warned against limiting the meaning of the phrase by attempting to precisely define the term, ‘manufacture.’ Instead, the court said that the expression is a general title to be interpreted in accordance with the purpose of the Statute of Monopolies and in line with common law principles established for the application of that purpose.

The inquiry which the definition demands is an inquiry into the scope of the permissible subject matter of letters patent and grants of privilege protected by the section. It is an inquiry not into the meaning of a word so much as into the breadth of the concept which the law has developed by its consideration of

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223 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 270 (the court noted that in Maeder v Busch (1938) 59 CLR 684, 706, Dixon J said that a widening conception of the notion of patentable subject matter has been a characteristic of the growth of patent law). Similarly, the High Court in Lockwood Security Products Pty Ltd v Doric Products Pty Ltd [2004] HCA 58, [66], by way of obiter dicta, recognised that since the growth of patent law demands it, ‘any attempt to fetter the exact meaning of “a manner of new manufacture” could never be sound’ citing Maeder v Busch (1938) 59 CLR 684, 706 (Dixon J) and National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 271 (Dixon CJ, Kitto and Windeyer JJ).

224 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 271. This approach was cited and followed in Grant v Commissioner of Patents [2006] FCAFC 120, [7]-[8].

225 Ibid 271.
the text and purpose of the Statute of Monopolies. One may remark that although the Statute spoke of the inventor it nowhere spoke of the invention; all that is nowadays understood by the latter word as used in patent law it comprehended in “new manufactures”. The word “manufacture” finds a place in the present Act, not as a word intended to reduce a question of patentability to a question of verbal interpretation, but simply as the general title found in the Statute of Monopolies for the whole category under which all grants of patents which may be made in accordance with the developed principles of patent law are to be subsumed.226

In answer to the question of whether the process claimed was a ‘manner of new manufacture’ the court said that it was a mistake to restate the question in the form: ‘Is this a manner (or kind) of manufacture?’227 The court said that this causes problems as it tends to limit one’s thinking to goods produced by hand or machine, which is too restrictive an approach to take. Rather, the court said that the correct question to ask is:

Is this a proper subject of letters patent according to the principles which have been developed for the application of section 6 of the Statute of Monopolies?228

In doing so, the court indicated that the approach to take is one that is consistent with the principles that have developed over time and can be observed from a reading of the case law on the matter. Therefore, any understanding and consideration of the concept and how it is to be applied to new and forms of invention requires an analysis of that body of case law, as the judges who constituted the High Court in NRDC did not intend to rewrite the existing law.229

The court made it clear that a manner of manufacture need not result in the production of a physical article. In the course of judgment, the court referred to what

226 Ibid 269.
227 Ibid.
228 Ibid.
229 Ibid.
had become known as Morton’s rule. To reiterate, in Re GEC’s Application,\textsuperscript{230} Morton J, while disclaiming the intention of laying down any hard and fast rule applicable to all cases, put forward the proposition that:

\begin{quote}
    a method or process is a manner of manufacture if it (a) results in the production of some vendible product or (b) improves or restores to its former condition a vendible product or (c) has the effect of preserving from deterioration some vendible product to which it is applied.\textsuperscript{231}
\end{quote}

The High Court adopted Morton J’s rule with reservation, accepting the requirement that a patentable invention be a vendible product, but rejecting any suggestion that Morton J’s rule is conclusive and thereby limits the meaning of ‘product’ to the three activities of production, improvement or restoration, and preventing deterioration of a physical product. Instead, the court said that Morton J’s rule may be accepted as long as the term, ‘product’ is taken to cover every end produced and ‘vendible’ is taken to point only to the requirement of utility in practical affairs.\textsuperscript{232} In doing so, it avoided the need for an invention to produce a physical effect or transformation.

In explaining the scope of manner of manufacture, the court said that to be patentable, an invention must be an artificially created state of affairs that is of economic significance, meaning that its value to the country must be in the field of economic endeavour, and that it must have ‘an industrial or commercial or trading character’.\textsuperscript{233} Further, it said the invention must offer some advantage that is material in the sense that it must be part of the ‘useful arts’ rather than the ‘fine arts’.

The point is that a process…must be one that offers some advantage which is material, in the sense that the process belongs to a useful art as distinct from a fine art.\textsuperscript{234}

\textsuperscript{230} (1942) 60 RPC 1. See above nn 172–174 and accompanying text.
\textsuperscript{231} National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 272 citing Re GEC’s Application (1942) 60 RPC 1, 4.
\textsuperscript{232} Ibid 276.
\textsuperscript{233} Ibid 275-277.
\textsuperscript{234} Ibid 275 citing Re Virginia-Carolina Chemical Corporation’s Application (1958) RPC 35, 36.
The ‘fine arts’ are normally taken to include the products of human intellectual activity, which seek expression through aesthetic creations such as painting, sculpture, music and literature.\(^{235}\) Thus, it can be said that the object of the manner of manufacture concept is promoting the useful arts, and the fine arts are excluded from its reach because they are appropriately the domain of copyright law.\(^{236}\)

The court identified several categories of excluded matter. It made clear that patents protect new inventions and not discoveries, be they discoveries of the laws of nature, physical phenomena, or abstract ideas.\(^{237}\)

There may indeed be a discovery without invention – either because the discovery is of some piece of abstract information without any suggestion of a practical application of it to a useful end, or because its application lies outside the realm of ‘manufacture’.\(^{238}\)

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\(^{235}\) Australian Patent Office Manual of Practice and Procedures Volume 2 - National, para 2.9.2.4 (‘Fine Arts’). According to Pila, ‘Inherent Patentability in Anglo-Australian Law’, above n 17, 136, ‘[a]rrangements of literary or artistic content to enhance the aesthetic or informational qualities of an object were not inventions for which a patent could be supported, unless the effect of the arrangement was to improve the functionality of the object itself.’ At note 212, she has arranged a list of examples of arrangements of literary or artistic content not possessing the mechanical inventiveness required of inventions from decisions prior to 1959. Some of those examples given are Re Ward’s Application for a Patent (Ward’s Application) (1911) 29 RPC 79 (SG) (an arrangement of information to create an indexing system); Re an Application for a Patent by C (C’s Application) (1919) 37 RPC 247 (SG) (a method of musical notation which distinguished sharps, flats and naturals by differences in colours, shapes or designs of characters on a printed sheet); Re an Application for a Patent by M (M’s Application) (1924) 41 RPC 159 (an arrangement of musical notes for instructional purposes).


\(^{237}\) National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 262-264. In this regard, Australian law seems to replicate the United States position. Examples of laws of nature include Sir Isaac Newton’s observations on the law of gravity and Albert Einstein’s general theory of relativity, while abstract ideas include novel and useful mathematical formulae: Diamond v Chakrabarty, 447 US 303, 309 (1980); Diamond v Diehr, 450 US 175, 185 (1981). By way of a recent example, in Milton Edgar Anderson [2008] APO 19 (11 August 2008) the Deputy Commissioner of Patents upheld the view that alleged inventions that relate to a mere scientific theory or discovery of the laws of nature without a specific practical and useful application are not a ‘manner of manufacture’. The application in question relates to ‘the new science of subtronics’ and ‘a new law of electric induction’. The applicant indicated that the inventive concept is the ‘revelation and utilisation of an antimatter voltage force that stems from the discovery of electrosubtronic fields and culminated in the new science of subtronics’. The Deputy Commissioner held that the invention claimed is a scientific theory or discovery of the laws of science without a specific practical and useful application and that, if a specific application were claimed, such an invention is not fully described.

\(^{238}\) National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 264. Laws of nature and physical phenomena are not patentable because the discovery of a law of nature, a principle of physical science, or a natural phenomenon is not an invention made by man. Thus, a new mineral discovered in the Earth or a new plant found in the wild is not patentable subject matter. Also excluded are methods of calculation, theoretical schemes (including business schemes and abstract plans): Grant v Commissioner of Patents [2006] FCAFC 120, [16].
The High Court held that the application before it disclosed a patentable invention since it:

exhibits the two essential qualities upon which “product” and “vendible” seem designed to insist. It is a “product” because it consists in an artificially created state of affairs, discernible by observing over a period the growth of weeds and crops respectively on sown land on which the method has been put into practice. And the significance of the product is economic; for it provides a remarkable advantage, indeed to the lay mind a sensational advantage, for one of the most elemental activities by which man has served his material needs, the cultivation of the soil for the production of its fruits.\(^{239}\)

The court did not see any reason to hold that agricultural and horticultural processes were a class of invention excluded from patentability.\(^ {240}\) The court described the historical denial of patents having ‘agricultural or horticultural’ characteristics as ‘a classic illustration of thinking in terms of the everyday concept of manufacture instead of following the lines along which, over a long period, the courts have given effect to the real purpose and operation of s 6 of the Statute of Monopolies’.\(^ {241}\)

Although the court overruled the earlier cases involving methods of treating soil to improve its crop-bearing qualities, it stressed that not all horticultural methods are inherently patentable, pointing out methods by which there is a modification of ‘the conditions under which natural phenomena pursue their inevitable course’\(^ {242}\) are not patentable if the thing they produce is the inevitable result of some characteristic inherent in that thing itself, and could not therefore be said to have resulted from the patented method. The court made the same point in respect of chemical process involving micro-organisms, in which, given the appropriate conditions, the desired result inevitably follows from the working of the process.\(^ {243}\)

\(^{239}\) *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 277.

\(^{240}\) Ibid 277-279.

\(^{241}\) Ibid 279.


\(^{243}\) Ibid citing *Re Joseph Szuecs Application* (1956) 73 RPC 25.
The fact that the High Court’s decision in NRDC is technologically neutral makes it arguably consistent with the obligations imposed by Article 27(1) the TRIPS Agreement\(^{244}\) requiring all member states to provide patent protection ‘for any inventions, whether products or processes, in all fields of technology’.

One question the High Court clearly left open in NRDC was whether a purely non-physical invention can be patentable subject matter.\(^{245}\) In this regard it said the following.

But a question which appears still to await final decision is whether it is enough that a process produces a useful result or whether it is necessary that some physical thing is either brought into existence or so affected as the better to serve man’s purposes.\(^{246}\)

By this statement the court acknowledged that the body of case law discussing the manner of manufacture concept does not conclusively resolve the question. Consistent with this statement, it can be seen that throughout the judgment, the court seemed to be at pains to avoid importing any physicality requirement into the subject matter inquiry. Not once did the court state that an invention must involve a physical article or physical matter. This would appear to be a deliberate strategy in keeping with the idea that the concept of patentability must be able to respond flexibly to inventions not yet envisioned.

In relation to what Morton J had said in Re GEC’s Application, the court stated that, while Morton’s rule is a useful tool to describe patentable subject matter, it is only useful to the extent that:

what is meant by a “product” in relation to a process is only something in which the new and useful effect may be observed.\(^{247}\)


\(^{245}\) McEnery, ‘Patents for Intangible Inventions after Grant v Commissioner of Patents (Part 1)’, above n 3, 72.

\(^{246}\) National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 270.

\(^{247}\) Ibid 275-276.
The court said:

But the judgment in the *Elton and Leda Chemicals Case* (1957) RPC 267 is also valuable for present purposes by reason of a suggestion which it contains as to the true office of the word “product” in such contexts as that of Morton J.’s “rule”. The learned judge said: “There has been no question, at any rate since before the year 1800, that the expression ‘manner of manufacture’ in the Statute of James I must be construed in the sense of including a practice of making as well as the means of making and the product of making. It has thus been appreciated that, although an inventor may use no newly devised mechanism, nor produce a new substance, none the less he may, by providing some new and useful effect, appropriate for himself a patent monopoly in such improved result by covering the mode or manner by means of which his result is secured. Seeing that the promise which he offers is some new and useful effect, there must of necessity be some product whereby the validity of his promise can be tested”.

Notwithstanding the use of the word “making”, which but for the context might have been taken to indicate the narrow view that an article or material must result if a process is to be a “manufacture”, the tenor of the passage seems to be that what is meant by a “product” in relation to a process is only something in which the new and useful effect may be observed.\(^{248}\)

However, the High Court did make one ambiguous statement, which may be the basis for some confusion regarding the existence of a physicality requirement, when it went as far as to say the following.

Sufficient authority has been cited to show that the “something” need not be a “thing” in the sense of an article; it may be any physical phenomenon in which the effect, be it creation or merely alteration, may be observed: a

\(^{248}\) Ibid citing the *Elton and Leda Chemicals Case* (1957) RPC 267, 268-269 (citations omitted).
Physical Effect in Patent Law

building (for example), a tract or stratum of land, an explosion, an electrical oscillation. 249

This statement makes the court’s position ambiguous because it is unclear what is meant by the use of the word ‘may’. If the word ‘may’ is used in an exclusive sense, it would indicate that an invention must produce a physical effect or cause a physical transformation of matter to be patentable.

The preferable view is that the court used ‘may’ in a permissive sense and was merely giving one example of the form patentable subject matter might take. In other words, the court was saying: there are many forms that patentable subject matter may take; it may be any physical phenomenon, as was described in Morton’s rule; or it might be something other than a physical phenomenon. That this is the better view is supported by the very next sentence of the judgment.

It is, we think, only by understanding the word “product” as covering every end produced, and treating the word “vendible” as pointing only to the requirement of utility in practical affairs, that the language of Morton J’s “rule” may be accepted as wide enough to convey the broad idea which the long line of decisions on the subject has shown to be comprehended by the Statute. 250

Here we have a clear attempt by the court to explain that what is meant by, ‘product’ is every useful end produced, without associating that end result with the word, ‘physical’. This interpretation is supported by the High Court in the later decision of Grain Pool. There the High Court described the finding in NRDC in the following way.

At the time of the enactment of the Constitution, there was still awaiting for final decision the question whether it was enough that a process produced a useful result or whether it was necessary that some physical thing either be brought into existence or be so affected such as better to serve the purposes of

249 Ibid 276.
mankind. The point was not settled until the celebrated judgment of Dixon CJ, Kitto and Windyeyer JJ in *National Research Development Corporation v Commissioner of Patents*. Their Honours held that the requirement of a “vendible product” for a valid process claim meant no more than that the end produced be of utility in practical affairs.\(^{251}\)

Accordingly, it is contended that the High Court in *NRDC* was not of the view that the law contains a physicality requirement.

C Post-NRDC Cases Discussing ‘Manner of Manufacture’

The High Court’s *NRDC* decision has been endorsed, followed and interpreted in a number of cases. Those cases are examined below according to the subject matter categories into which they fall.

1 Methods of Medical Treatment

Although the legislation does not expressly exclude methods of medical treatment from patentability, before the decision in *Joos v Commissioner of Patents* in 1972,\(^{252}\) it was thought that surgical or medical treatment of the human body, as well as non-medical procedures such as cosmetic treatments, were excluded from patentability.\(^{253}\)

*Joos v Commissioner of Patents* concerned a cosmetic process of treating human hair and nails. The issue considered by the court was whether this process is a patentable ‘manner of manufacture’ for the purposes of the predecessor to the current legislation, the *Patents Act 1952* (Cth). Barwick CJ regarded the process as patentable, but distinguished it from medical treatment of disease, malfunction or incapacity, which he thought, without deciding the matter, might be ‘essentially non-economic’ in nature and therefore unsuitable for the grant of patent rights. In contrast his Honour


\(^{252}\) (1972) 126 CLR 611 (Barwick CJ).

\(^{253}\) Ibid 619-620. The source of the belief that surgical or medical treatment of the human body are not patentable appears to be *Re C & W’s Application* (1914) 31 RPC 235 (SG). See also *(Upjohn) Robert’s Application* [1977] RPC 94.
regarded a cosmetic treatment of the human body as being of economic significance.254

His Honour considered the need, as described in NRDC, for an invention to be of economic or commercial significance, not to be that a process must have a commercial application.255 Instead, his Honour considered that the underlying notion was that the activity must fall within the useful arts, rather than the fine arts.256

The conclusion he reached was that the activity of the hairdresser does not fit within the fine arts, but does fit comfortably within the useful arts.257 Given this explanation, it is hard to conceive that his Honour, if the question were put before him in an appropriate case, would find non-cosmetic medical treatment of disease, malfunction or incapacity essentially non-economic. His Honour said:

In this case, the processes are to be used in what cannot be described otherwise than as a commercial activity of hairdressing, a sector of activity which accounts, I imagine, for a great deal of employment. I could not assign the skill of the hairdresser to the area of the fine arts and have little difficulty in placing it in the area of the useful arts. In my opinion, it is an activity in the field of economic endeavour and has commercial significance as those expressions ought to be understood in relation to the grant of patents.258

In Anaesthetic Supplies Pty Ltd v Rescare Ltd,259 the Full Court of the Federal Court appeared to accept that a device and method for dealing with sleep apnoea was patentable subject matter, although the patent failed on other grounds. Following Gummow J’s first instance decision,260 Lockhart and Wilcox JJ by majority rejected the assertion that a method of treating the human body might be ‘generally

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254 Ibid 619-623. Obviously his Honour was influenced by cases such as Re C & W’s Application (1914) 31 RPC 235 and Schering AG’s Application [1971] RPC 337 in this regard.


256 Ibid 624 citing Re Virginia-Carolina Chemical Corporation’s Application (1958) RPC 35, 36.

257 Ibid 624.

258 Ibid.

259 (1994) 50 FCR 1 (Lockhart, Sheppard and Wilcox JJ).

inconvenient’. They held that it is for Parliament, not the courts, to determine whether otherwise patent eligible inventions should be denied protection on matters of ethics and social policy.

Lockhart J explained the dilemma that patents over methods of treating the human body brings.

On both humanitarian and economic grounds the search for medical advance is to be encouraged. The award of limited monopolies is a standard way of helping to compensate for the expense of research. Ultimately the resolution of this question is a balancing exercise. There is on the one hand a need to encourage research in connection with methods of medical treatment and on the other hand the need not unduly to restrict the activities of those who engage in the therapy of humans.\textsuperscript{261}

His Honour resolved the question on technology-neutral and industry-neutral grounds, saying that what is required is recourse to logic, not emotion or policy.

In my opinion, there is no justification in law or in logic to say that simply because on the one hand substances produce a cosmetic result or a functional result as opposed to a curative result, one is patentable and the other is not. I see no reason in principle why a method of treatment of the human body is any less a manner of manufacture than a method for ridding crops of weeds as in \textit{NRDC}. Australian courts must now take a realistic view of the matter in the light of current scientific development and legal process; the law must move with changing needs and times.\textsuperscript{262}

For Lockhart J, the fact that Parliament had not excluded methods of medical treatment from patentability was telling.

There is no statutory provision in Australia prohibiting the grant of a patent for a process of medical treatment of a human ailment or disease in a human

\textsuperscript{261} \textit{Anaesthetic Supplies Pty Limited v Rescare Limited} (1994) 50 FCR 1, 16.

\textsuperscript{262} Ibid 19.
being. It is noteworthy that Parliament had the opportunity to exclude methods of treating the human body when it enacted the 1990 Act, but the limit of the exclusion was s. 18(2), namely: ‘human beings, and the biological processes for their generation, are not patentable inventions’.263

Similarly, Wilcox J said:

The important point, it seems to me, is that the Australian Parliament has not been persuaded by the policy considerations arguing against patentability. Parliament has never excluded a method of human medical treatment from patentability or the definition of “invention”; not even in the recent statute, the Patents Act 1990, that revised Australian patent law and made a specific provision (s.18(2)) dealing with the patentability of human beings and the biological processes for their generation. I appreciate that both this statute and its predecessor, the 1952 Act, left intact the principles developed by the courts in connection with the application of s.6 of the Statute of Monopolies...

However, I believe that, in the face of apparently deliberate decisions by Parliament not to build this particular exclusion into its legislation, courts should be hesitant to introduce the exclusion by reference to those very general principles.

Wilcox J also echoed the view that it is not the role of the courts to decide ‘involve matters of ethics and social policy’ when Parliament has elected not to do so.

I find unpersuasive the alternative bases for the exception advanced by some judges. They involve matters of ethics and social policy upon which the courts have no special expertise. In my opinion, for the courts to resort to any of them, in order to engraft onto a recently enacted statute an exception that Parliament has chosen not to adopt, would be to usurp that institution’s role.264

Only Sheppard J found to the contrary, holding that granting a patent for a method of

263 Ibid.
264 Ibid 45.
medical treatment would be ‘generally inconvenient’. His Honour’s rationale was that a court should not contemplate granting a patent over a surgical procedure to one medical practitioner if to do so might result in the death or unnecessary suffering of countless people.

The disease in question here is life-threatening. The evidence shows that, if it is not relieved, it may lead to heart failure and death. The treatment for which letters patent are sought… is treatment which may cure or at least relieve symptoms and signs which are highly dangerous to the human body. ... The grant of a patent in these circumstances seems to me to be generally inconvenient. It is not going too far, I think, to say that the Court should not contemplate the grant of letters patent which would give to one medical practitioner, or perhaps a group of medical practitioners, a monopoly over, for example, a surgical procedure which might be greatly beneficial to mankind. Its denial might mean the death or unnecessary suffering of countless people. I cannot think that this is really what the medical profession as a whole would seek to achieve. Its whole history is a denial of the proposition.265

The approach to the patentability of methods of medical treatment taken in Anaesthetic Supplies Pty Ltd v Rescare Ltd was affirmed by the Full Court of the Federal Court in Bristol-Myers Squibb Company v FH Faulding & Co Ltd.266 Bristol-Myers Squibb Company v FH Faulding & Co Ltd concerned the validity of two petty patents for methods of administering taxol, a compound originally obtained from the bark of the Pacific yew tree, that has been found to inhibit the growth and division of certain cancer cells.267 The methods prescribed the doses of taxol to be administered over certain timeframes.268 In cases such as this, it is important to distinguish between patent for a drug and a patent for a method of administering a drug. Taxol is a naturally occurring compound and thus in itself unpatentable. At the priority date, taxol was a known substance and its great promise as an anti-cancer drug had been known for many years. What was not known were the optimal doses by which the drug should be administered to reduce toxicity within the body, which is the problem

265 Ibid 41.
267 Ibid [1].
268 Ibid [4].
this invention was designed to overcome. In upholding the patentability of the method, Black CJ and Lehane J pointed out ‘the insurmountable problem, from a public policy viewpoint, of drawing a logical distinction which would justify allowing patentability for a product for treating the human body, but deny patentability for a method of treatment.’\(^{269}\)

While they mark some progression in the thinking regarding the application of patent law to methods of treating of the human body, none of the cases involving methods of medical treatment makes specific reference to the need to produce a physical effect or cause a physical transformation of matter. Although all methods of medical treatment involve biochemical transformations occurring within the human body, the courts’ focus has instead been on the economic or commercial significance of the methods employed. Thus, they demonstrate that it is commercial significance, and not physicality, that is the essential prerequisite to patent-eligibility.

2 Computer Software

The next big step in the evolution of the patentable subject matter standard was the acceptance of computer software patents as patent eligible subject matter. However, from the decided cases, it is only clear that a computer software program that controls a machine which performs an industrial or manufacturing process is patentable subject matter.\(^{270}\) What is less clear is whether computer software running on a known general purpose computer that does not produce or physically transform a tangible article, but merely manipulates or outputs data, is patent eligible.\(^{271}\)

General purpose computers and software have a symbiotic relationship. General purpose computers provide a generic platform upon which software can run. Software is a series of instructions that instruct a computer to perform a particular function. Once running software, general purpose computers behave like specific machines designed to perform the particular function the software is coded to perform. Most general purpose computers are inoperable in the absence of computer software. Thus,

\(^{269}\) Ibid [15].
\(^{270}\) *Diamond v Diehr*, 450 US 175 (1981).
\(^{271}\) *CCOM v Jiejing* (1994) 122 ALR 417 would suggest that it is.
it is software, rather than hardware, that dictates much of the functionality of general purpose computers. Likewise, software without a computer is useless. General purpose computers are a boon to innovation. They are an underlying foundation upon which new innovative programs can be built. They allow new information-processing advances to be devised by programmers who, with the help of an operating system, do not need to be concerned with, or even understand, the interaction between the software code and the computer hardware upon which it runs.

It was initially thought that copyright was the appropriate form of intellectual property protection for computer software and that computer software was not amenable to patent protection because it fell within the prohibition on offering patents for schemes, plans for business, directions for performing a mental act and intellectual information. However, when put to the test, courts overcame these difficulties by applying general principles of patent law and found computer software to be patentable subject matter, as Australian law fell into step with the position in the United States. The courts focussed on the application of the program to produce a practical and useful result, rather than treating software as being nothing more than intellectual information. This approach debunked any suggestion that computer software was a special category of innovation that required special rules.

(i) Pre-1977 United Kingdom Computer Software Decisions

272 Functionality can of course also be built into hardware. However, the beauty of building functionality at the software level is that software is much easier and less expensive to produce than specifically programmed hardware machines or components.

273 James Lahore, 'Computers and the Law: The Protection of Intellectual Property' (1978) 9 Federal Law Review 15, 22-23. British Petroleum Co Ltd’s Application (British Petroleum) (1968) 38 AOJP 1020, 1021 (stating that methods of operating a general-purpose computer are inherently unpatentable because they are not a manner of new manufacture. It was also considered public policy that an owner of hardware should be able to use his or her machine freely ‘as he thinks fit’: ‘Computer programming is a relatively young art and, although many stratagems and simplifications have been devised so far, a much greater number may be expected to be devised in the future. It would certainly be mischievous to the State and generally inconvenient if, after investing a million dollars in a computer, the owner were to find himself prevented from operating it efficiently, or in any other manner he may wish, or with any degree of privacy or secrecy he may desire.’); Badger Company Incorporated’s Application (Badger) [1970] RPC 36, 40 (PAT) (finding a method of preparing, tabulating and codifying data to be inherently unpatentable because of the conceptual nature of the raw material, and its failure to contribute to the fashioning of a product).


275 CCOM v Jiejing (1994) 122 ALR 417, [128]; Grant v Commissioner of Patents [2006] FCAFC 120, [29]; Welcome Real-Time v Catuity [2001] FCA 445, [122], [128]. Unlike in other jurisdictions, such as in Europe, there is no legislative provision in Australia expressly limiting the patentability of computer software. The Patents Act 1990 (Cth) does not define or refer specifically to software.
In two pre-1977 United Kingdom cases it was held that computer programs are a proper subject matter for letters patent when embodied in some physical form.

In *Burroughs Corporation (Perkin’s) Application*, the question before the Patents Appeal Tribunal was whether a claim to a method of transmitting information between a central master computer and a ring of outlying connected slave computers is a proper subject matter for letters patent. The tribunal held that, provided the method involved some alteration in the operability of a physical object, the test set out in *NRDC* would be satisfied and the method would be patentable.

In relation to the requirement that there be a ‘vendible product’, Graham J said:

> it is not enough to take a narrow and confined look at the ‘product’ produced by a method. Of course, if a method is regarded purely as the conception of an idea, it can always be said that the product of such a method is merely intellectual information. If, however, in practice the method results in a new machine or process or an old machine giving a new and improved result, that fact should in our view be regarded as the ‘product’ or the result of using the method, and cannot be disregarded in considering whether the method is patentable or not.

Graham J expressed the view that computer software can be patented and will not be regarded merely as intellectual information to the extent that its claims are directed to an embodiment in some apparatus or process of manufacture.

> If the bare method or idea is also clothed by the patentee in his specification with a practical garment in the shape of apparatus enabling that method or idea to be realised in practice, it should no longer be regarded as a naked

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276 [1974] RPC 147 (PAT) (Graham and Whitford JJ). Graham J gave an opinion on behalf of the Tribunal.
277 Ibid 158.
278 Ibid.
conception, for it has found a practical embodiment in the apparatus. It is then a manner of new manufacture.\textsuperscript{279}

His Honour distinguished\textit{ Rolls-Royce Limited’s Application}, which involved no modification of the aircraft itself in order to make it operate more quietly.

In the present case the method necessarily involves a modification. The system is programmed so that it must in every case operate in accordance with the method claimed whenever and by whomsoever it is put into operation. The programme in fact constrains the apparatus to function in a particular way as long as the apparatus embodies that programme. In the \textit{Rolls-Royce} case on the other hand it can be said that the method was no more than information or instructions which could be given to a pilot on which he might, or might not, act.\textsuperscript{280}

Graham J then went on to draw a connection between computer software and a physical effect when he said, ‘computer programs which have the effect of controlling computers to operate in a particular way, where such programs are embodied in physical form, are proper subject matter for letters patent.’\textsuperscript{281}

This demonstrates that his Honour considered the mere fact that the computer software would need to be recorded on some physical storage media, such as magnetic tape (as would have been the readily available technology at the time), or that the software would run on a physical device such as a computer, to be the determining factors. It was these physical aspects that his Honour relied upon to classify the software as inherently patentable rather than purely intellectual information.\textsuperscript{282} However, while this statement indicates that his Honour considered

\textsuperscript{279} Ibid.
\textsuperscript{280} Ibid 160.
\textsuperscript{281} Ibid 161.
\textsuperscript{282} Graham J agreed with the contention of Mr Rogers of counsel that \textit{Slee & Harris [1966] RPC 194} was wrongly decided. The claim in \textit{Slee & Harris} was for a ‘method of operating a computer’ that involved an improve technique of ‘linear programming’. It was refused (at 196-197) on the basis that the only ‘product’ of the method was intellectual information which was not a ‘vendible product’. Mr Rogers contended (at 158) that the decision is unsound because the result of the method in question is a computer which operates in a novel way that can be assumed to be useful.
these physical aspects to be indicative of patent eligibility, it does not necessarily indicate that they are a prerequisite to patent eligibility.

This decision was followed four years later by Graham and Whitford JJ in *International Business Machines Corporation’s Application (IBM’s Application)*, the last case relating to computer programs decided in the United Kingdom before the commencement of the 1977 Act. The case involved the automation of a known method of processing financial data in a computer software program. It was held that the method of operating or controlling a conventional computer to process financial data was inherently patentable, as was the computer program by which the method was effected. The software program involved was designed to automatically calculate the selling price of stocks or shares by comparing a list of buy and sell orders.

Despite accepting that the scheme was not itself novel and that a completely standard computer could be programmed to perform it, Graham and Whitford JJ upheld the patent. The argument that a known computer programmed in a new way differed in intellectual content only, and was thus inherently lacking novelty, was expressly rejected. The court held that ‘[t]here must be different holes in the card [embodying the program] or different magnetic patterns on the tape, or some other automatic control imposed to ensure that the computer carries out the particular operation required’. Thus, it was differences in the physical manifestation of data as recorded on physical media that precluded treatment of the program and programmed computer as being mechanically equivalent to previous programs and computers respectively.

Graham and Whitford JJ held that the inventor sought to claim a method involving the operation or control of a computer programmed in accordance with the inventor’s method, such that more than mere ‘intellectual information’ was involved because the method was involved in the program and in the apparatus in physical form. Thus,

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284 Ibid 569.
286 Ibid 572.
this is an example of a patent having been granted merely in respect of a means of using a computer to automate a known process.

The decisions in these cases have found favour in Australia. *Burroughs Corporation (Perkin's) Application* was later cited with approval in 1991 by Burchett J in the Federal Court decision of *International Business Machines Corporation v Commissioner of Patents*, and both decisions were cited with approval by the Full Court of the Federal Court in 1994 in *CCOM v Jiejing*.

(ii) *International Business Machines Corporation v Commissioner of Patents*

In one of the earlier Australian cases involving computer software, *International Business Machines Corporation v Commissioner of Patents*, Burchett J held that software inventions are potentially patentable subject matter given the expansive approach taken in *NRDC*. The invention in question concerned an improved ‘method and apparatus for generating curves on computer graphics displays.’ It was objected to on the grounds that it recites, and wholly pre-empts, a mathematical algorithm. The word, ‘algorithm’ was defined by the court to mean, ‘a procedure for solving a given type of mathematical problem.’

Burchett J drew the same distinction between a mere algorithm and a useful commercial application of the algorithm as had been drawn in the United States, and held that the software in dispute was the latter. His Honour held that, while the mathematics of the invention were not new, the application to computers to produce an improved curve was a new and commercially useful result in the field of computer graphics, and the invention was patentable.
Just as those compounds were previously known, so here, it is not suggested there is anything new about the mathematics of the invention. What is new is the application of the selected mathematical methods to computers, and in particular, to the production of the desired curve by computer. This is said to involve steps which are foreign to the normal use of computers and, for that reason, to be inventive. The production of an improved curve image is a commercially useful effect in computer graphics.  

With regard to physical effect or transformation, Burchett J only held that the method of producing an improved cured image on a computer would be patentable because it creates a ‘commercially useful effect’. He did not say that the invention in question was patentable because it involved a physical aspect in the form of a computer to run the software or some storage device to store the software, although he may have thought it unnecessary to do so given that he cited Burroughs Corporation (Perkin’s) Application favourably. On the other hand, it could be that his Honour chose to disregard this aspect of those decisions without drawing attention to the fact he had done so. It would appear unlikely that Burchett J would have been in favour of a physicality requirement as his Honour preferred the view that it is by ‘the production of some useful effect that patent law has distinguished... between the discovery of a principle of science and the making of an invention’. Consequently, it can be assumed that where a commercially useful effect can be discerned from the terms of the claim, the claim concerns an invention as opposed to a principle of science or law of nature, and is therefore inherently patentable subject matter, regardless of any physical basis to the claim.

(iii) CCOM v Jiejing

The decision of Burchett J in *International Business Machines Corporation v Commissioner of Patents* was affirmed by the Full Court of the Federal Court in *CCOM v Jiejing*. In *CCOM v Jiejing*, the Full Court considered the patentability of

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293 Ibid 424.
294 Ibid.
295 Ibid 423.
296 Christie and Syme, above n 29.
297 (1994) 122 ALR 417 (Spender, Gummow and Heerey JJ).
a Chinese language word processor. The invention is a computer software apparatus used to assemble and record text in Chinese characters. It consists of software running on a conventional computer with a standard keyboard and monitor specially adapted to facilitate input of Chinese characters from a database.298

In a unanimous decision, the Full Court found the invention to be patentable subject matter.

The NRDC Case (102 CLR at 275-277) requires a mode or manner of achieving an end result which is an artificially created state of affairs of utility in the field of economic endeavour. In the present case, a relevant field of economic endeavour is the use of word processing to assemble text in Chinese language characters. The end result achieved is the retrieval of graphic representations of desired characters, for assembly of text. The mode or manner of obtaining this, which provides particular utility in achieving the end result, is the storage of data as to Chinese characters analysed by stroke-type categories, for search including “flagging” (and “unflagging”) and selection by reference thereto.299

The court addressed the relationship between patentable inventions and physical form when discussing the concept of manufacture. In relation to the invention in NRDC, the Full Court said that the ‘central question in the case’ was:

whether a process for killing weeds could be within the relevant concept of invention in s 6 because it produced a useful physical result in relation to a material or tangible entity.300

Read alone, this statement does not make clear whether the Full Court was reading a physicality requirement into the NRDC test, or whether it considered the presence of a physical aspect only to be an indication or ‘clue’ that a method involving the use of an algorithm is patentable, as opposed to being a mere abstract idea. At no point in

298 Australian Petty Patent No. 616,154 (‘Symbol Definition Apparatus’).
the judgment does the court specifically state that producing a physical effect or causing a physical transformation of matter is a required element of patent-eligibility.\textsuperscript{301}

It is, however, made clear by the cases involving computer software inventions cited by the Full Court in the course of its reasons that it is the second of these that is supported.\textsuperscript{302} That is, the court regarded physicality as merely a clue that indicates patentability. The court noted that in the last case relating to computer programs decided in the United Kingdom before the commencement of the 1977 Act, \textit{International Business Machines Corporation’s Application},\textsuperscript{303} Graham and Whitford JJ, sitting as the Patents Appeal Tribunal, held that a claim to software designed to automatically calculate the selling price of stock or shares in an auction market involved more than just ‘intellectual information’ because the method was involved in the program and in the apparatus in physical form.\textsuperscript{304} There was nothing in that case that indicated that the judges saw this physical form as a prerequisite to patentability.

The court also noted the earlier Federal Court decision of \textit{International Business Machines Corp v Commissioner of Patents},\textsuperscript{305} in which Burchett J followed the earlier decision of the Patents Appeal Tribunal in \textit{Burroughs Corporation (Perkin’s) Application}, where the same two judges, Graham and Whitford JJ, expressed the view that ‘computer programs which have the effect of controlling computers to operate in a particular way, where such programs are embodied in physical form, are proper subject matter for letters patent.’\textsuperscript{306} The judges expressed the view that a computer software invention can be patented, and will not be regarded as merely

\begin{flushleft}
\textsuperscript{301} In particular see the court’s application of the law to the facts: \textit{CCOM v Jiejing} (1994) 122 ALR 417, 450.
\textsuperscript{303} (1980) FSR 564.
\textsuperscript{305} (1991) 33 FCR 218; 105 ALR 388.
\end{flushleft}
intellectual information, to the extent that it claims an embodiment in some apparatus or process of manufacture.  

CCOM v Jiejing firmly established in Australia that computer software is something more than an unpatentable mathematical algorithm or a mere abstract idea. Following CCOM v Jiejing, it would seem that the mere presence of a physical device associated with a computer program will be enough to ensure it will not be rejected for being an unpatentable mathematical algorithm or a mere abstract idea, provided that the combination of the device and software satisfies the NRDC requirement that a method be a manner of achieving an artificially created state of affairs that is of practical utility in the field of economic endeavour. However, there is nothing in the decision to suggest that physicality is a prerequisite to patentability. Given that the technology is such that most computer software runs on general purpose computers, it seems at first glance that a lack of physical effect is not likely to be a successful argument against patenting computer software.

With respect, the views of Burchett J in International Business Machines Corp v Commissioner of Patents, and Graham and Whitford JJ in Burroughs Corporation (Perkin’s) Application and International Business Machines Corporation’s Application are problematic. The view taken by these judges is that computer software is certainly patent eligible because the general purpose computers it runs, and the media the programs are recorded on, are physical objects. This ignores the fact that computers and data storage devices are not a part of the inventive concept of software, but are the base upon which the inventive concept is built. As a result of these cases, claims would need to be drawn as a method of operating a computer or a new combination of an existing known computer and a new and inventive software program. The problem with this logic is that the physical aspect is not embedded in the algorithm as such, but rather exists in the computer upon which the software runs. The approach fails to consider the argument that since software is an intangible product, it has no ties to a physical platform. It is true that software requires a physical device such as a general purpose computer upon which to run or a storage

307 Burroughs Corp (Perkin’s) Application [1974] RPC 147, 158.
medium upon which it is recorded. However, the novel and inventive elements that give the software value over the prior art exist separately to any physical platform. Further, that physical platform forms part of the prior art and therefore lacks novelty and inventiveness. This is consistent with the idea that a pre-existing known computer programmed in a new way running a new piece of software becomes a new machine or process or an old machine giving a new and improved result. Therefore, it can be seen that the presence of a physicality requirement in Australian law would necessitate a reconsideration of whether computer software is patentable, or an explanation of how software running on a general purpose computer could possibly satisfy the physicality requirement. On the other side of the coin, the patentability of computer software demonstrates that a physicality requirement is not an essential element in the patentable subject matter test. The better view is that taken by Federal Court in CCOM v Jiejing, which involves an investigation as to whether the manner of obtaining the end result achieved is a manner of manufacture, irrespective of the presence of any physical effect or transformation of matter.

3 Business Methods

While it is now clear that business methods, as a class, are not automatically excluded from patentability, it can only really be said with certainty that a business method will fall safely within the scope of patentable subject matter if it operates sufficiently upon, or in relation to, some tangible physical item or device.

309 The business method exception to patentability was rejected in the United States in State Street Bank & Trust Co. v Signature Financial Group, Inc., 149 F.3d 1368, 1375 (Fed. Cir. 1998) (‘We take this opportunity to lay this ill-conceived exception to rest.’) aff’d in AT&T Corp v Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999) and In re Bilski, 545 F.3d 943, 960 (Fed. Cir. 2008) (en banc). The State Street rejection of the business method exception was followed by the Federal Court of Australia in Welcome Real-Time SA v Catuity [2001] FCA 445, [125]-[126] (Heerey J) and Grant v Commissioner of Patents [2006] FCAFC 120, [26]. The patentability of business methods should not have been perceived to be as much of a mystery as one might have thought, given that the modern decisions refuting the business method exception were pre-empted by Cooper’s Application (1901) 19 RPC 53, 54, and by Re Fishburn’s Application (1938) 57 RPC 245, 248, where Morton J said that while a mere scheme or plan is not the proper subject of a patent, an alleged invention which serves a mechanical purpose that has useful results does not become an unpatentable scheme or plan merely because the purpose is in the carrying on of a branch of business.

310 Grant v Commissioner of Patents [2006] FCAFC 120.
For a time, the prevailing assumption in Australia had been that business methods, as a class of invention, were excluded from patentability. In *Quigley Co Inc’s Application*, the Assistant Commissioner of Patents was asked to consider the patentability of a method of increasing steel production by operating two or more furnaces in accordance with a roster to make more effective use of workers. The claim involved a method of increasing steel production by operating two or more furnaces in accordance with a schedule. Neither the steel making process itself nor the operation of a furnace throughout a steel producing period was new. The steel produced was not improved or modified in any way.

In relation to the submission that this met the expansive criteria laid down in *NRDC*, the Assistant Commissioner said that a management technique is not patentable subject matter.

I find nothing in those decisions which suggest that such a commonplace management technique as scheduling for the better utilisation of manpower is proper subject matter of a patent. [The applicant] argued that, as more steel is produced in a given period, the method is of economic importance. However, the greater steel output is not due to any change in the method of producing steel or in the way a furnace is operated. It results from the fact that, by operating his directions, the crew is employed more effectively and performs more work in that period.

The Assistant Commissioner of Patents, took the view that nothing in the *NRDC* case suggested that a management technique for the better utilisation of manpower was a proper subject matter for a patent, despite the fact that the crew was more effectively employed and use of the method resulted in greater steel output.

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311 James Lahore, ‘Computers and the Law: The Protection of Intellectual Property’ (1978) 9 Federal Law Review 15, 22-23 (‘Some matter has never been considered to constitute a patentable invention. This matter includes a method of calculation or a process of mathematical operations [including ways of solving mathematical problems], business, commercial and financial schemes, schemes of operation, and printed sheets, cards, tickets or the like which are mere records of intelligence.’); Ricketson, ‘Business Method Patents: A Matter of Convenience?’, above n 32, 109-111.
312 [1977] FSR 373.
313 Ibid.
He has merely devised a roster or schedule for his work force so as to obtain more work from a normal crew in a given period. He realised that all of the men in a normal crew were not fully employed throughout the duration of a steel producing period. He decided to take up some of the slack by partly overlapping the steel producing periods of two furnaces during that part of the campaign when both are operating at less than the maximum number of steel producing heats per day. It is true that this more effective direction of his work force enables him to obtain more steel producing heats, and thereby produce more steel, in a given period. But that does not alter the fact that all he has done is to devise a roster or schedule to direct the activities of his men in carrying out the various known procedures in the known process of making steel.\textsuperscript{314}

According to Ricketson, similar results are to be observed in a number of other pre-\textit{NRDC} Australian cases.\textsuperscript{315} However, it is difficult to see how such a view is consistent with the principles laid down in \textit{NRDC}, given that the method that was sought to be protected is a process involving the practical operation of an inventive concept to produce an improved result and that is of utility and economic significance.

The notion that Australian law might contain a business method exception was rejected in Australia in \textit{Welcome Real-Time SA v Cuity Inc.} (‘\textit{Welcome Real-Time v Cuity’}).\textsuperscript{316} The invention considered in \textit{Welcome Real-Time v Cuity} is a method and device for the operation of smart cards in connection with traders’ loyalty programs. The smart cards in question contain microprocessors or chips able to receive and store information. The problem to be overcome was that the smart cards have only ‘a small memory capacity’, which when using conventional ‘static’ methods to store information, can only store loyalty points information in relation to a

\begin{footnotesize}
\textsuperscript{314} Ibid.
\textsuperscript{315} Ricketson, ‘Business Method Patents: A Matter of Convenience?’ above n 32, 109-110 citing the following: \textit{Re Brown} (1899) 5 ALR 81 (Supreme Court of Victoria) (an improved method of preventing the fraudulent re-use of sales book dockets); \textit{Commissioner of Patents v Lee} (1913) 16 CLR 138 (an improved method for charcoal burning, consisting of no more than directions for use of existing burners); \textit{Neilson v Minister of Public Works} (1914) 18 CLR 423 (an improved method for utilising an existing mechanism of septic tank purification); \textit{Rogers v Commissioner of Patents} (1910) 10 CLR 701 (a method of felling trees by use of fire).
\textsuperscript{316} [2001] FCA 445 (Heerey J).
\end{footnotesize}
limited number of traders, being fewer than the number of traders who use loyalty programs. The invention overcame this problem by using a dynamic memory allocation technique so the cards could be used across thousands of merchants each operating their own proprietary loyalty programs. One of the advantages of the dynamic memory allocation technique used was that a portion of memory on a card was only allocated to a trader once a consumer carrying the card actually used that trader’s services.  

Heerey J, sitting as a single judge in the Federal Court, upheld the patentability of this invention after applying the manner of manufacture test set out in *NRDC*. In doing so, his Honour distinguished between an unpatentable abstract idea and an idea reduced to a specific practical application in a manner consistent with the approach taken in *CCOM v Jiejing*.

In my opinion the Patent does produce an artificial state of affairs in that cards can be issued making available to consumers many different loyalty programs of different traders as well as different programs offered by the same trader. All this can be done instantaneously at each retail outlet. So what is involved here is not just an abstract idea or method of calculation. Moreover this result is beneficial in a field of economic endeavour - namely retail trading - because it enables many traders (including small traders) to use loyalty programs and thereby compete more effectively for business.  

In doing so, he recognised that the invention before the court involves both a method and a device, and as such is not a pure, or non-physical, business method.

What is disclosed by the Patent is not a business method, in the sense of a particular method or scheme for carrying on a business ... Rather, the Patent is for a method and a device, involving components such as smart cards and POS terminals, *in a business*; and not just one business but an infinite range of retail businesses.  

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317 Ibid [18].
318 Ibid [127].
319 Ibid [128] (original emphasis).
In assessing the patent eligibility of this invention, Heerey J made clear that, like in the United States, there is no business method exception to patentability in Australia. His Honour found the Federal Circuit’s *State Street Bank & Trust Co v Signature Financial Group* (‘*State Street*’) decision persuasive, despite the United States test for patentable subject matter being different to that in Australia, and the United States patent law having a different historical source owing little or nothing to the *Statute of Monopolies*. The reasons his Honour gave to support this finding were that:

> the social needs the law has to serve in that country are the same as in ours. In both countries, in similar commercial and technological environments, the law has to strike a balance between, on the one hand, the encouragement of true innovation by the grant of monopoly and, on the other, freedom of competition.

In relation to the physicality issue, Heerey J noted that the High Court in *NRDC* had not determined the issue of whether an invention requires a physical effect or transformation of matter to be patentable. Therefore, his Honour did not regard the law as requiring that there be a physically observable effect. He also noted that he did not need to decide the issue, because the invention before him did involve a ‘physically observable effect’.

The respondents’ argument for distinguishing *CCOM* - the supposed lack of “physically observable effect” - turns on an expression not found in *CCOM* itself. Nor does such a concept form part of the Full Court’s reasoning. In any event, to the extent that “physically observable effect” is required (and I do

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320 *State Street Bank & Trust Co. v Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied* 525 US 1093 (1999). According to the Federal Circuit in *State Street*, an invention will be patentable subject matter if it ‘produces a useful, concrete and tangible result’, a test the meaning of which the court never explained. The test has since been abandoned, having been described by the Federal Circuit as being ‘insufficient to determine whether a claim is patent-eligible’ in *In re Bilski*, 545 F.3d 943, 959 (Fed. Cir. 2008).


322 Ibid.

323 Ibid [113].
not accept that this is necessarily so) it is to be found in the writing of new information to the Behaviour file and the printing of the coupon.324

The invention claimed in *Welcome Real-Time v Catuity* does not involve the creation of a machine or other physical device. Instead, it is a means of recording data on an existing physical device. It arguably involves a transformation of matter. After a smart card is used in accordance with the claimed method, the state of the magnetic strip that houses the data is altered to the extent that electrons that comprise the strip are re-arranged to record the data stored on the card. This is not an incidental physical transformation. It is integral to the dynamic data storage method claimed.

In both *Welcome Real-Time v Catuity* and *CCOM v Jiejing* the patentable inventions were commercially useful methods of manipulating data and information. In both cases the reduction of the methods to electronic devices had replaced what had previously been a laborious exercise in manual and mental administration: collecting a prescribed number of stamps that were then sent to a central location and a gift sent in return in *Welcome Real-Time v Catuity*; and translation from one language into another in *CCOM v Jiejing*. It is this automation that gives the inventions practical utility and economic significance. This suggests that automated methods are patentable subject matter, provided they are sufficiently described and capable of exact, or substantially identical, repetition.

While the invention in *Welcome Real-Time v Catuity* is clearly patentable subject matter, it is arguable that the invention does not involve an inventive step, and that accordingly, the case was wrongly decided. At the time the patent application was lodged, the dynamic storage method used was a known method of data storage. The only element of novelty was the application of dynamic storage techniques in the provision of loyalty reward schemes. The inventive step found in *Welcome Real-Time v Catuity* is an analogous use of a known process, which would arguably have been obvious to a person skilled in the art of computer software programming at the priority date. Finding an analogous use of a known method is the equivalent to finding a new use for a known device. Analogous uses of known objects, be they

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324 Ibid [128].
devices or processes, are inherently unpatentable because they are substantively identical to the object itself, where the object is understood within the context of the ends to which it has been applied in the past. This concept was explained in *Losh v Hague*,\(^{325}\) using a spoon as an example.

[I]t would be a very extraordinary thing to say, that because all mankind have been accustomed to eat soup with a spoon, that a man could take out a patent because he says you might eat peas with a spoon. The law on the subject is this: that you cannot have a patent for applying a well-known thing which might be applied to 50,000 different purposes, for applying it to an operation which is exactly analogous to what was done before. Suppose a man invents a pair of scissors to cut cloth with, if the scissors were never invented before, he could take out a patent for it. If another man found he could cut silk with them, why should he take out a patent for that?\(^{326}\)

Heerley J identified the relevant art as being the provision of loyalty programs. He held that the invention involved an inventive step because it would have been unreasonable to expect people skilled in loyalty programs to be aware of dynamic storage techniques used in computer programming.\(^{327}\) Had his Honour identified the relevant art as being computer software programming, he might have reached a different conclusion. From his Honour’s judgment, it is clear that the only scientific ingenuity and experimental research required had been done by those in the computer programming industry who had perfected the technique before it was ever conceived of being used in relation to loyalty schemes. The software programming technique to allocate memory dynamically was well known in 1995, but was not something that had been applied to loyalty cards. After that work was made known to the public, only a routine application of technical skills were required to implement the dynamic storage method in the magnetic strip of a loyalty card. The fact that dynamic storage techniques had not been used in the field of loyalty schemes, while it indicates novelty, does not necessarily indicate that the product involves an inventive step. It is hard to escape the conclusion that this product would have been obvious to someone

\(^{325}\) *Losh v Hague* (1838) 1 Web Pat Cas 202 (NP).
\(^{326}\) *Ibid* 208.
with knowledge of computer software programming techniques. This narrow categorisation of the relevant art as the business field of loyalty programs, rather than computer programming, is problematic because it sets the bar for inventive step too low. Being inventive in the eyes of the law surely must involve something more than being able to say, there is a technology residing in another field of endeavour; let us apply that technology in our industry. From an economic perspective, insignificant research, work or expenditure would have been needed on the part of a capable person to apply the dynamic storage technique to loyalty cards, to justify the inconvenience to the public that a patent monopoly brings. This is particularly the case where software is concerned. Software is a general purpose technology that is used in a number of different segments of business and industry.

4 Biotechnology: Living Organisms and Genetic Materials

Few people today are unaware of the great benefits and potential of new developments in biotechnology. Following the NRDC decision, it would appear that there is no prohibition in Australia on patents for new developments in biotechnology, and that inventions of this nature ought not be treated differently to other subject matter.

It can be surmised that the Australian position in relation to patentability of living organisms and genetic materials is consistent with that in the United States. While the patentability of living organisms has not been considered by the courts in Australia, in 1976 in Ranks Hovis McDougall Ltd’s Application, a Deputy Commissioner of Patents held that living organisms may be patentable inventions provided they have improved or altered useful properties and not merely changed morphological characteristics which have no effect on the working of the organism.

In 1995 in Kirin-Amgen Inc v Board of Regents of University of Washington, it was made clear that a purified and isolated DNA sequence satisfied the NRDC concept of

329 (1976) 46 AOJP 3915.
an ‘artificially created state of affairs.’ The case involved an opposition to a patent application for a purified or isolated DNA sequence encoding the human protein erythropoietin, which plays a major role in the formation of red blood cells. In a decision that was upheld by the Federal Court on appeal, a Deputy Commissioner of Patents stated that, ‘In my view, a claim directed to naturally occurring DNA characterised by specifying the DNA coding for a portion of that molecule would likely be claiming no more than a discovery per se and not be a manner of manufacture’. He found, however, that the patent application in issue was not directed to a mere discovery of naturally occurring DNA because it claimed purified and isolated DNA sequences that were ‘an artificially created state of affairs’.

D General Inconvenience

The requirement that an invention not be ‘generally inconvenient’ stems from s 6 of the Statute of Monopolies, which provides an exception to the prohibition against monopolies, but only to the extent that they ‘be not contrary to the Lawe nor mischievous to the State, by raising prices of Commodities at home, or hurt of Trade, or generallie inconvenient’. General inconvenience is not a well understood aspect of the law. It is widely thought that, in addition to the heads of validity in s 18, the words ‘generally inconvenient’ provide a ground upon which the courts may deny what would otherwise be a patentable invention on flexible grounds of public policy, public interest, morality, or other extra-legal considerations.

That this is not the case was demonstrated as far back as Darcy v Allen in 1603, where it was recognised that patents could only be invalidated if they were considered generally inconvenient for interfering with established industries and trades. Thus

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331 Ibid 569.
332 Affirmed without discussion on this point in Genetics Institute v Kirin-Amgen (No 3) (1998) 41 IPR 325 (FCA).
334 Ibid.
335 It is suggested that the phrase, ‘be not contrary to the Lawe nor mischievous to the State, by raising prices of Commodities at home, or hurt of Trade, or generallie inconvenient’, was intended to be read together, rather than be broken into individual elements.
‘general inconvenience’ marks the beginnings of the modern requirements of novelty and arguably inventiveness. The ‘general inconvenience’ principle is that the limitation of patents to ‘new manufactures’ meant they could not be used to create monopolies over the production of known items or over existing trades and industries, since to do so would cause the public much inconvenience without the necessary attendant benefit of a new industry or trade being introduced to the realm.\(^{336}\)

Lord Coke, who was involved in the drafting of the statute, explained that the term, ‘generally inconvenient’ prohibits any new manufacture that turned ‘many men to idleness’.\(^{337}\)

[A] mans trade is accounted his life, because it maintaineth his life; and therefore the monopolist that taketh away a mans trade, taketh away his life, and therefore is so much the more odious.\(^{338}\)

\(^{336}\) For example, *Liardet v Johnson* (1778) 1 Carp Pat Cas 35 (NP) (referring to the prejudice that would be caused to trade by the granting of monopoly rights for known inventions); *Cropper v Smith* (1884) 1 RPC 81, 90 (Bowen LJ) (CA) (‘It would be a most serious matter for trade in modern times if a familiar arrangement which was common to other classes of machines could be patented in its application to a new and analogous purpose’); *Re Waterhouse’s Patent* (1906) 23 RPC 470 (CA) (stating that a lack of subject matter should not be found where some substantial and useful advance on prior knowledge has been made; the question in such cases being utility and not inherent patentability); *Gadd v The Mayor, &c, of Manchester* (1892) 9 RPC 516 (in which patents for the adaptation of an old contrivance to a new purpose that present no difficulties to persons skilled in the art were described as ‘intolerable nuisances’ and ‘mischievous to the State’); *The Patent Bottle Envelope Company v Seymour* (1858) 141 ER 65, 69 (stating that to allow a patent for the application of a well known tool to work previously untried materials or to produce new forms ‘might tend to produce oppressive monopolies in the application of old and well-known implements to new materials, without any further novelty or merit than the discovery of the material, or the form into which it is to be worked.’); *Arkwright v Nightingale* (1785) 1 Carp Pat Cas 38 at 47 (CP) (‘We must never decide patent rights upon any idea of public benefit; a cause between two individuals cannot be determined upon consequential reasons, that it would be beneficial to the public that one should prevail. The law has established the right of patents for new inventions; that law is extremely wise and just.’); *Walton v Bateman* (1841) 1 Web Pat Cas 613 (NP) (stating, in directions to the jury in respect of a plea that a patent for improvements be invalidated as being of no public use or benefit and thus injurious to the public: ‘I really do not understand to what that [plea] applies – I do not understand how it is raised’). In *Patterson v The Gas Light and Coke Company* (1875) LR 2 ChD 812 (CA); Aff’d (1876) 3 App Cas 239 (HL), which was upheld on appeal by the House of Lords, James LJ found a direction and instruction regarding a means for improving a method of purifying coal gas to be incapable of supporting a patent, despite its admitted value and utility, for the reasons that ‘[n]o one has a right to prevent a workman from using care to keep his tools in the most efficient state… [or] to prevent a manufacturer from cleansing his vessels and throwing away the useless contents whenever he likes, or to ask him his motives or intentions in doing so.’ It is, however likely that this was not the exercise of a wider public policy-based restriction, but an exercise of the prohibition on interfering with existing trades.

This is consistent with the Crown’s express reservation of existing rights of manufacture in its early patent grants, and, from 1575, for its insistence on a clause in certain patents enabling the Crown or Privy Council to revoke the grant at any time for ‘inconvenience’. Lord Coke explained the requirement that a new manufacture not be ‘mischievous to the State’ as being that it should not result in the ‘raising of prices of commodities at home’ and that it be of urgent necessity and utility.

Denying the patentability of inventions lacking utility on general inconvenience grounds was justified to ensure the public is not hampered by patents for frivolous articles. However, those reasons would appear to no longer warrant a finding that an invention is ‘generally inconvenient’ since modern statutes separate the heads of novelty, inventiveness and usefulness from the ‘manner of manufacture’ element.

General inconvenience has rarely appeared as a separate ground of invalidity in decided cases. It instead tends to be used as a collateral support for a finding of...


341 Morgan v Seaward (1837) 150 ER 874, 881 (Ex) (citing the reference to ‘general inconvenience’ in the Statute of Monopolies to support a view of utility as guardian of the public interest, such that any subject matter that is ‘altogether useless’ be regarded as incapable of supporting a patent). In T S’s Application [1924] 41 RPC 530, 538 (SG) an opposition to an application for a mechanism for continuous motion without external force was made on the basis of its alleged uselessness and the ‘general inconvenience’ that would result were a patent granted. In reaching his decision the Solicitor-General equated ‘general inconvenience’ with utility, and held that ‘the inconvenience which might ensue by the granting of patents in frivolous cases’ was ‘largely mitigated by the power of the court to inquire into questions of utility’ citing Morgan v Seaward (1837) 150 ER 874, 881 (Ex) (“These difficult words [‘generally inconvenient’] have been applied by Sir Edward Coke to an invention for fulling in a mill and not being manual labour which was held to be ‘inconvenient in that it would turn so many labouring men to idleness’. During the development of the industrial system this ground of objection to a patent, that it would cause unemployment, has long since been abandoned, some economists taking the view that, if unemployment be caused in one occupation by an invention, employment is thereby caused in another and, in my view, whatever may be the truth of this contention, the fact is that these words in their proper meaning are now obsolete and in any event cannot have reference to an alleged invention which, on the Comptroller’s assumption, is useless and cannot work and therefore could scarcely have the effect of ‘throwing labouring men into idleness’.”).
invalidity on other grounds. In *Roll’s Royce Ltd’s Application*, Lloyd-Jacob J, sitting as the Patents Appeal Tribunal, found that a patent for a method of operating a known aircraft so as to reduce noise levels during take-off was not patentable subject matter on the ground that it was ‘outside the operation of any of the useful arts’. He also found that the invention would be ‘mischievous to the State by being generally inconvenient’ because ‘the responsibility of a pilot of an aircraft in flight carrying scores of passengers is already sufficiently onerous without adding to his burden the task of avoiding infringement of a statutory monopoly in the operation of his standard engine controls unless the justification for grant is reasonably manifest.'

Although patent law necessarily involves finding a balance between competing and sometimes conflicting policy considerations, it has been recognised that the balance is struck by the terms of the *Statute of Monopolies* itself. Australian courts in modern times have taken the view that it is not their role to entertain policy issues when they are deciding whether to uphold a patent. Instead, consistently with the cases on general inconvenience, they have found that questions of policy are to be determined by the legislature, which does so in the terms set out in the Act. For a court to hold that a particular class of invention is not patentable on policy grounds would be inconsistent with the approach established in this regard by the Full Court of the Federal Court in *Anaesthetic Supplies Pty Limited v Rescare Limited*. The Full Court in that case reviewed decisions dealing with the manner of manufacture test and methods of treating humans and decided that it is the role of Parliament, rather than the courts, to decide whether matters of ethics or social policy are to have any impact on what is patentable. The Federal Court’s position in this regard was confirmed in *Bristol-Myers Squibb Co v FH Faulding & Co Ltd*.

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344 Ibid 255.
345 Ibid 256. There was similar reasoning in *Hiller’s Application* [1969] RPC 267, 268 (PAT), where a plan for subterranean utility distribution schemes was denied a patent with reference to the ‘unfair and unreasonable’ burden that the patent would impose on persons responsible for providing gas, electricity, water and sewage disposal services for residential properties.
346 (1994) 122 ALR 141 (Lockhart, Sheppard and Wilcox JJ); cf *Joos v Commissioner of Patents* (1972) 126 CLR 611 (Barwick CJ) (ratio decidendi).
Finally, Heerey J in *Welcome Real-Time v Catuity* rejected general inconvenience as a stand-alone basis of invalidity. His Honour made short shrift of arguments that, if the patent were not revoked, it would place an undue restraint upon other traders and thereby be generally inconvenient.

But if an invention otherwise satisfies the requirement of s 18 it can hardly be a complaint that others in the relevant field will be restricted in their trade because they cannot lawfully infringe the patent. The whole purpose of patent law is the granting of monopoly.\(^{349}\)

Given that our patent statute now provides as separate requirements that an invention be novel, inventive, and useful, the ‘general inconvenience’ proviso has little application in contemporary patent law. There appears to be few, if any cases, in Anglo-Australian law that have relied solely on general inconvenience to invalidate a patent claim that would otherwise have been valid.\(^{350}\) What is clear, however, is that the concept does not establish a separate public interest test that can be relied upon to invalidate patents that a particular judge might consider to be not in the public interest.\(^{351}\) Therefore, that given the development of modern strictures of inherent patentability, novelty, inventive step, and confirmation that policy questions are to be determined by the legislature, there is no basis for denying a patent on grounds of ‘general inconvenience’.

### E Observations to be Drawn From the Pre-Grant Case Law

There are a number of observations to be made from the historical survey of the existing case law undertaken. The first is the very general and uncontroversial observation that patent law in Australia protects the products of intellectual effort and protects the results of human ingenuity that fall within the useful arts and are of practical utility and economic significance. Within that observation are a number of ‘strands’ addressed in various cases. These are that: the scope of patentable subject

\(^{349}\) *Welcome Real-Time v Catuity* [2001] FCA 445, [132].

\(^{350}\) Brennan, above 342, 12.

\(^{351}\) While there is no separate general inconvenience requirement, the exclusion of inventions that are ‘contrary to law’ is now codified in s 50(1)(a), which provides, ‘The Commissioner may refuse to accept a request and specification relating to a standard patent, or to grant a standard patent: (a) for an invention the use of which would be contrary to law’.  

306
matter includes that which is of economic or commercial significance (the notion of vendibility) and involves the practical application of ideas or principles to produce a useful result; the scope of patentable subject matter includes that which provides utility of a mechanical nature; there is a requirement in Australian common law that patents only be granted in respect of inventions that promote the ‘useful arts’, and that subject matter concerning the fine arts are not protected; and finally, the presence of a physical effect or transformation will suffice to indicate patent-eligibility, but is not a prerequisite.

That the scope of patentable subject matter includes that which is of economic or commercial significance (the notion of vendibility), and involves the practical application of ideas or principles to produce a useful result, is evident in almost all the cases examined dating back to *Boulton and Watt v Bull* and *The King v Wheeler*. However, this view of the law is not evident in all the cases. In some cases, this view is displaced in favour of a more restrictive requirement, that an invention be directed to utility of a chemical or mechanical nature.\(^{352}\) While the scope of patentable subject matter includes inventions of a mechanical nature, since cases such as *Re C & W’s Application*\(^{353}\) and *NRDC*, it would seem that the focus of patentable subject matter is in law broader than this.

The requirement in Australian common law that patents only be granted in respect of inventions that promote the ‘useful arts’, and that subject matter that concerns the fine arts are not protected, must be beyond dispute now that the High Court has endorsed this principle in *NRDC*.\(^{354}\)

While none of the cases preceding *Grant* specifically address the issue of whether the ‘manner of manufacture’ test contains a physicality requirement, the law is necessarily uncertain on this point. However, there are strong indications that the

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\(^{352}\) *Re Cooper’s Application for a Patent (Cooper’s Application)* (1901) 19 RPC 53 (AG); *Rogers v Commissioner of Patents* (1910) 10 CLR 701 (Griffith CJ and O’Connor J); *Re an Application for a Patent by Fishburn (Fishburn’s Application)* (1938) 57 RPC 245 (PAT).

\(^{353}\) (1914) 31 RPC 235 (SG).

\(^{354}\) The principle, although consistent with the earlier cases, appears to have been first articulated in *Re Virginia-Carolina Chemical Corporation’s Application* (1958) RPC 35. It was endorsed in *National Research Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 276 and followed in all subsequent cases.
presence of a physical effect or transformation will suffice to indicate patent-eligibility, but is not a necessity. The cases make clear that there can be no patent for a mere principle or an abstract idea, because principles and ideas are not inventions. Instead, they establish that processes which involve principles reduced to achieve a specific result that are embodied in physical objects or substances are patentable subject matter. However, that does not mean that non-physical processes are necessarily unpatentable principles or abstract ideas. In fact, most judges do not appear to have considered the possibility of non-physical processes, let alone sought to exclude them from the bounds of patentable subject matter. Instead, the cases show that the presence of a physical effect or transformation of matter is merely an example of one form that patentable subject matter may take, rather than an invariable requirement.

These are solid and established principles of patent law. They date back to the earliest cases that consider the concept of manufacture in the late eighteenth century, *Boulton and Watt v Bull* and *The King v Wheeler*. In this respect, mention ought to be made of the fact that the High Court of Australia, in *Lockwood Security Products Pty Ltd v Doric Products Pty Ltd (No 2)* noted that it had earlier in *NRDC* endorsed the formulation of principle in *The King v Wheeler*. There the court said the following.

When considering the patentability of ideas it is necessary to remember that a “manner of manufacture” requires “something of a corporeal and substantial nature” [citing *R v Wheeler* (1819) 2 B & Ald 345, 350 [106 ER 392, 395] (Abbott CJ)]. The expansion of “a manner of new manufacture” through case law which has been “characteristic of the growth of patent law” came to rest with the acknowledgment in *National Research Development Corporation v Commissioner of Patents* that any attempt to fetter the exact meaning of “a manner of new manufacture” could never be sound.

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355 See also *Househill Iron Co v Neilson* (1843) 1 Web Pat Cas 673 (HL) in which the House of Lords confirmed the approach taken by Alderson B in *Jupe v Pratt* (1837) 1 Web Pat Cas 145 (Ex) that all abstract principles may be patentable, subject to their having been directed to a practical application.
These principles are also supported by the more recent cases, including: Re C & W’s Application; the cases decided by Evershed J, The Cementation Company’s Application and Re Rantzen’s Application, in which his Honour described the question of whether an invention requires a physical or material character as not important; and the Elton and Leda Chemicals Case in which Lloyd-Jacob J equated ‘vendible’ with things of commercial value, thereby indicating that the concept of vendibility extends beyond the bounds of material and physical constraints.\(^{358}\)

In contrast, there are only a handful of cases which indicate that the law may contain a physicality requirement, all of which have been overruled. These are Cooper’s Application, where Sir Robert Finlay A-G may have found in favour of a physicality requirement by his statement that, ‘[t]he subject with reference to which you must apply for a Patent must be one which results in a material product of some substantial character’;\(^{359}\) the decisions of Morton J in Fishburn’s Application; Re GEC’s Application (Morton J’s ‘rule’ requiring a vendible product) which were held in NRDC to be too narrow an interpretation if read literally; Maeder v Busch (which contains Dixon J’s obiter dicta referring to the need for a ‘tangible thing’); and the horticulture cases (Bovingdon’s Application; Re Standard Oil Development Co’s Application; and Re the Dow Chemical Company’s Application for a Patent, which were overruled by the High Court in NRDC. In fairness to his Honour, given that Morton J in Re GEC’s Application indicated that he did not intend to lay down a hard-and-fast rule, it is difficult to ascribe to him an intention to limit patent-eligibility with a physicality requirement. A small number of the cases examined, namely, Re Virginia-Carolina Chemical Corporation’s Application and Rolls-Royce Limited’s Application do not appear to indicate either the presence or absence of a physicality requirement.

\(^{358}\) See also Rogers v Commissioner of Patents (1910) 10 CLR 701 (Isaacs J) (dissent); Cornish v Keene 132 ER 530, 536, where it was held that production of a vendible article is sufficient test of patentability, but not the only test.

\(^{359}\) Cooper’s Application (1901) 19 RPC 53, 54. Equally, it could be said that his Honour in this case was not in favour of physicality requirement. It is simply too difficult to say one way or the other.
Then, there is NRDC itself. Although the judges in NRDC said that the question of whether a non-physical invention is patentable subject matter remained undecided, the answer is evident in the High Court’s reasoning. The beauty of the NRDC approach to the manner of manufacture question is its flexibility and ability to adapt to ‘excitingly unpredictable’ changes in technology. The difficulty with its approach is that it is tough to identify restrictions on the scope of patentable subject matter that can be easily applied on a case-by-case basis. However, that is the nature of the patentable subject matter standard in all jurisdictions. The only recognised excluded matter in NRDC are mere principles, abstract ideas and discoveries, and matter that lies outside the useful arts. The excluded matter does not include non-physical inventions, since non-physical inventions are not necessarily going to be mere principles, discoveries or abstract ideas. Accordingly, it must be said that the reasoning and decision in NRDC is entirely consistent with the cases preceding it, which create a patentable subject matter inquiry that does not make reference to physical effect or transformation. Rather, those principles show that the boundary between patentable subject matter and abstract ideas or principles is specific practical application, not physicality.

Finally, it can be said that the post-NRDC cases that precede Grant do not create a physicality requirement either. It appears that the judges in the cases involving methods of medical treatment, and the cases involving living organisms and genetic materials, did not consider a physicality requirement because they were preoccupied with the morality of the methods before them. Likewise, the computer software cases do not support a physicality requirement. The focus of those cases has largely been on the practical outcomes software programs achieve, rather than whether they produce a physical effect or cause a physical transformation of matter. On a very broad view, it could be said that computer software as we know it today always involves a physical aspect because software needs to be recorded on some sort

360 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 270.
361 Joos v Commissioner of Patents (1972) 126 CLR 611; Anaesthetic Supplies Pty Ltd v Rescare Ltd (1994) 122 ALR 141.
of physical media and run on a computer (which is a physical device). However, rather than supporting a physicality requirement, these cases would tend to suggest that physicality is only a ‘clue’ to patentability, not a necessity. A more realistic view is that computer software is purely an intangible product, devoid of meaningful physical elements. Taking this view would lead to the conclusion that a physicality requirement would invalidate computer software patents that run on general purpose computers (which accounts for most computer software). This would clearly be inconsistent with the existing Anglo-Australian case law confirming the patentability of software. Following the software cases is the decision of a single judge of the Federal Court, Heerey J, in *Welcome Real-Time v Catuity*, who repeated the fact that the High Court had not determined the issue of whether an invention must produce a physical effect or cause a physical transformation of matter and expressed doubt that such a requirement exists.364

Accordingly, there is very little in the pre-*Grant* Anglo-Australian law that supports a physicality requirement and much that supports a broad and flexible approach to patentable subject matter that is devoid of physical constraints.

IV  NON-PHYSICAL INVENTIONS: THE GRANT DECISION

A  Facts and Decision

1  Patentable Subject Matter

The Full Court of the Federal Court of Australia for the first time considered the patentability of a purely non-physical method in *Grant*.365

The court considered the patentability of what the applicant, Mr Grant, described as an ‘asset protection method’, which is a method to protect an asset from the claims of creditors. It involves creating a trust, the person making a gift of money to the trust,  

364 *Welcome Real-Time SA v Catuity Inc* [2001] FCA 445, [113], [128]. Interestingly, Heerey J’s view had changed by the time he sat as a member of the Full Court that decided *Grant v Commissioner of Patents* [2006] FCAFC 120.

365 *Grant v Commissioner of Patents* [2006] FCAFC 120 (Heerey, Kiefel and Bennett JJ). The applicant sought leave to appeal to the High Court, which was refused: *Grant v Commissioner of Patents* [2007] HCA Trans 126.
the trustee lending a sum of money to the person, and the trustee securing the loan by taking a charge over the asset. The aim of the method is that the trustee, by virtue of having taken a charge over the asset, would thereby have priority over other creditors of the person in whose favour debts may arise later in time. The innovation patent in question claims a method of applying the law. In effect, the patent involves reserving the exclusive right to apply certain aspects of the law in a particular way to achieve a useful result for the benefit of one individual.

For the purposes of determining whether this method is patentable subject matter, it is not necessary to understand in detail the workings of the trust arrangement. It is sufficient to know that the invention can be categorised as an intangible legal business method, being a sequence of steps that a lawyer might advise a client to follow to achieve a particular result. The key issue to understand is that this is a purely intangible method that does not produce, operate or alter a physical object or produce a physically observable effect.

The court unanimously held that an invention must produce a physical effect or cause a physical transformation of matter to be a patentable invention and accordingly ordered that the patent be revoked. It held that Grant’s invention is not patentable subject matter since it does not produce, operate or alter a physical object or produce a physically observable effect. The court used three different expressions to explain the requirement.

[T]he method of his patent does not produce any artificial state of affairs, in the sense of a concrete, tangible, physical, or observable effect.

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367 The utility and effect of the patent was described in this way by the trial judge: Grant v Commissioner of Patents [2005] FCA 1100 (Branson J).
368 cf Charles Lawson, ‘Grant v Commissioner of Patents and Patenting Knowledge Inventions’ (2008) 15 Journal of Law and Medicine 626, 640-641, who construed Grant’s invention as having a physical effect (‘Grant’s invention was a method of creating a real effect on physical things, and having applied the method making the physical documents (the trust, a gift, a loan and a security) there were real-world consequences including retaining possession of real assets.’). Although in practice, it may be necessary to document one or more of the steps in the process, it is not the documentation that gives effect to the method, but rather, it is the legal structures that are created that give effect to the arrangement. The recording or evidencing the trust, gift, loan or security on paper, even if required by law, is merely ancillary to the legal relationships that are effected.
369 Grant v Commissioner of Patents [2006] FCAFC 120, [30], [32], [47].
370 Ibid [30].
A physical effect in the sense of a concrete effect or phenomenon or manifestation or transformation is required.\textsuperscript{371}

It is necessary that there be some “useful product”, some physical phenomenon or effect resulting from the working of a method for it to be properly the subject of letters patent.\textsuperscript{372}

The court categorised the invention as being a business method concerned with ‘actions of financial and legal consequence’.\textsuperscript{373} Consistent with the expectation that patent law not discriminate between fields of technology, the court predictably stated that patent protection is afforded to any invention that complies with the requirements of the \textit{Patents Act 1990} (Cth) and that accordingly, business methods are not automatically excluded from the scope of patentable subject matter.\textsuperscript{374} To this effect the court said:

While a mere scheme or plan is not the proper subject of a patent, an alleged invention which serves a mechanical purpose that has useful results does not become such an unpatentable scheme or plan merely because the purpose is in the carrying on of a branch of business.\textsuperscript{375}

However, while the court accepted that business methods are not excluded from patentability, it found that a business method removed from any physical apparatus or other physical embodiment is not patentable.

The approach the Full Court took in reaching this conclusion of law was to ask whether the invention is a proper subject of letters patent according to the principles which have been developed for the application of section 6 of the \textit{Statute of Monopolies}. The court examined a long line of cases dating back prior to the \textit{NRDC} decision and observed that the patentability of an invention that does not produce a

\textsuperscript{371} Ibid [32].
\textsuperscript{372} Ibid [47].
\textsuperscript{373} Ibid [2].
\textsuperscript{375} Ibid [14] citing \textit{Re Fishburn’s Application} (1938) 57 RPC 245, 248.
physical effect or cause a physical transformation of matter has never been upheld.\textsuperscript{376} This is not surprising as none of the cases the court considered involved the patentability of an invention that does not produce a physical effect or cause a physical transformation of matter.

The Full Court acknowledged that Heerey J in \textit{Welcome Real-Time v Catuity} did not accept that a physically observable effect was necessarily required, although he held such an effect was present in the case before him. Their Honours took from Heerey J’s judgment that he had:

distinguished between an abstract idea, a method of calculation or a business method (in the sense of a particular method or scheme for carrying on business) which his Honour described as non-patentable and a claim to a method and device for use in business, that is a practical operation of an abstract idea. His Honour drew a distinction between a technological innovation which is patentable and a business innovation which is not.\textsuperscript{377}

In contrast, the court regarded any method that does not produce a physical result as merely ‘intellectual information’ and a scheme which has never been patentable.\textsuperscript{378} After distinguishing Mr Grant’s application from that considered in \textit{Welcome Real-Time v Catuity}, the court upheld the decision that Mr Grant’s patent be revoked on the ground that it does not produce a physical effect or cause a physical transformation of matter. In doing so, the court equated a failure to produce a physical effect or cause a physical transformation of matter with Mr Grant’s process.

\textsuperscript{376} The court considered: \textit{Burroughs Corp (Perkins’) Application} [1974] RPC 147; \textit{Commissioner of Patents v Lee} (1913) 16 CLR 138; \textit{Commissioner of Patents v Microcell Ltd} (1959) 102 CLR 232; \textit{International Business Machines Corporation’s Application} [1980] FSR 564; \textit{International Business Machines Corporation v Commissioner of Patents} (1991) 33 FCR 218; \textit{Neilson v Minister of Public Works (NSW)} (1914) 18 CLR 423; \textit{Re Brown} (1899) 5 ALR 81; \textit{Re Cooper’s Application for a Patent} (1901) 19 RPC 53; \textit{Re ESP’s Application} (1944) 62 RPC 87; \textit{Re Fishburn’s Application} (1938) 57 RPC 245; \textit{Re GEC’s Application} (1942) 60 RPC 1; \textit{Re Johnson’s Application for a Patent} (1901) 19 RPC 56; \textit{Re Lenard’s Application} (1954) 71 RPC 190; \textit{Re W’s Application} (1914) 31 RPC 141; \textit{Rogers v Commissioner of Patents} (1910) 10 CLR 701. The court noted that in \textit{NRDC}, an artificial effect was physically created on the land, and that in each of \textit{Welcome Real-Time v Catuity Inc, CCOM v Jiejing} and in the United States decisions of \textit{State Street Bank & Trust Co v Signature Financial Group} and \textit{AT&T Corp v Excel Communications, Inc}, there was a component physically affected or a change in state or information in a part of a device or machine.

\textsuperscript{377} \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [24].

\textsuperscript{378} Ibid [14]-[23].
being a mere scheme or intellectual information, rather than an invention suitable to warrant the grant of letters patent. 379

Having made its finding of law, the Full Court did not go on to explain what sort of physical effect or transformation must be present in an invention to make it patentable subject matter. The only guidance we have on this issue is the three statements of principle the court gave. 380 Obviously, an invention that is a new physical device or machine or involves a physical transformation of tangible and physical matter will satisfy this test. What is not clear is whether mere physical steps, that involve the use of existing physical objects but do not transform them from one state into another, such as those inherent in human movements or communications between humans, is patent eligible. 381

The court also addressed as a separate issue the question of whether methods of interpretation and application of the law to achieve a useful result are patentable. The court used the expression, ‘legal discoveries’ to describe this class of invention. It held that they are not patentable for two reasons. The first was that the interpretation and application of the law would not be considered as having, in the words of NRDC, an ‘industrial or commercial or trading character’, despite the practice of law being an area of economic importance. The court distinguished between an invention that has an industrial, commercial or trading character and one that is of economic importance. It indicated that a development, say for example in the fine arts, may be of economic importance, but that does not necessarily give it an industrial, commercial or trading character. Secondly, the court classified all ingenuity and imagination which may produce new kinds of transactions, advices, schemes, or arguments as discoveries rather than inventions. 382

In the course of its reasoning, the court responded to an issue raised by the Deputy Commissioner of Patents in Re Peter Szabo and Associates Pty Ltd, 383 who revoked a

379 Ibid [32].
380 Ibid [30], [32], [47]. See above n 369.
381 See Order Granting En Banc Hearing of In re Bilski, No. 2007-1130, 2008 WL 417680 (Fed. Cir. Feb 15, 2008), where this issue was raised before the United States Court of Appeals for the Federal Circuit; In re Bilski, 545 F.3d 943, 961 (Fed. Cir. 2008).
382 Ibid [34].
patent over a similar legal method on the grounds that the invention he considered does not involve the application of science or technology or involve the application of a law of nature.\textsuperscript{384} The subject matter in that case was a method of releasing equity in real property using a reverse mortgage to provide security for and a means of repaying a loan. Once again, this is an invention making use of the laws of Australia and it has no physical embodiment. In support of this reasoning, the Deputy Commissioner sought to read into the \textit{NRDC} decision a requirement that an invention requires the application of science and technology in order to be an artificial state of affairs, rather then merely requiring the involvement of human endeavour in any form.\textsuperscript{385} The court did not give an opinion as to whether there is a requirement that an invention be within the realm of science or technology in order to be patentable, but did express doubt that this would be the case. It said that to impose such a requirement would be to risk imposing the kind of rigidity that the High Court in \textit{NRDC} warned against.\textsuperscript{386}

2 \textit{Novelty}

The court dealt briefly with the issue of novelty. The judges were of the view that there must be many trusts using the same combination of elements that anticipate Mr Grant’s invention, rendering it unpatentable for lack of novelty.

The financial transaction to protect an individual’s assets therefore utilises a trust, a gift, a loan and a security. There is no suggestion of any novelty in those integers.\textsuperscript{387}

In reaching this view, the court did not refer to s 101B of the Act which deals with examination of an innovation patent. Section 101B(3) provides that for the purposes

\textsuperscript{384} Ibid [61]-[62].
\textsuperscript{385} Ibid [36].
\textsuperscript{386} \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [35] - [38]. The same Deputy Commissioner of Patents who conducted the examination proceeds in \textit{Re Peter Szabo and Associates Pty Ltd} (D Herald) initially revoked the patent in \textit{Grant v Commissioner of Patents} for similar reasons, that the invention does not involve the application of a law of nature or the application of technology to implement the method of the invention. In doing so he expressed concern that there might be no limits to what is patentable subject matter if such a test were not observed: \textit{Stephen John Grant} [2004] APO 11, [25]-[28]. For more on the Deputy Commissioner’s decision in \textit{Stephen John Grant} see McEniery, ‘Patents for Intangible Inventions after \textit{Grant v Commissioner of Patents} (Part 2)’, above n 3, 100-101.
\textsuperscript{387} \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [4].
of an innovation patent, the prior art base ‘is to be taken not to include information made publicly available only through the doing of an act (whether in or out of the patent area)’ when determining whether the invention is novel and involves an innovative step. That is, prior art information used to demonstrate that the patent has been anticipated must be contained in documentary evidence.

3 The Threshold Requirement of ‘Invention’: The Use of Known Products

The court, citing NRDC and Microcell, was also of the opinion that the invention failed to meet the threshold requirement of ‘invention’.

Assuming novelty, the proposed scheme represents a new use of known products (a trust, a gift, a loan and a security) with known properties for which their known properties make them suitable (the creation of a structure of financial rights and obligations or even a change in the person’s legal circumstances). That is not the proper subject of letters patent.\(^{388}\)

What the court appears to have said here is that the invention is merely a collocation of known elements. In order for ‘combination claims’ or a ‘mere collocation of integers’ to be patentable, the combination must be more than just the sum of its parts, that is, there must have been an element of inventiveness in the decision to assemble the particular components chosen to create something new and useful.\(^{389}\) The court appears to say that combining the elements in the way that Mr Grant has done is not inventive.

4 Arguments of the Trial Judge, Branson J

Finally, the Full Court discarded the contention of Branson J, from whose decision Mr Grant had appealed,\(^{390}\) that an invention should only enjoy patent protection if the


\(^{390}\) Grant v Commissioner of Patents [2006] FCA 1100 (Branson J). On appeal, Branson J, a single judge of Federal Court, upheld the decision of the Deputy Commissioner to revoke the patent, but gave
social cost of the resulting restrictions upon the use of the invention is counterbalanced by resulting social benefits.\textsuperscript{391} Her Honour chose not to consider whether an invention that does not produce a physical effect or cause a physical transformation of matter is patentable subject matter. For that reason her decision can be dealt with briefly. Instead, her Honour upheld the revocation of the patent for the reason that ‘the performance of the invention will not add to the economic wealth of Australia or otherwise benefit Australian society as a whole.’\textsuperscript{392}

\textbf{[A]}n invention should only enjoy the protection of a patent if the social cost of the resulting restrictions upon the use of the invention is counterbalanced by resulting social benefits. This principle is derived from the theoretical justification for the grant of a patent; that is, the assumed value of inventive ingenuity to the economy of the country.\textsuperscript{393}

Quashing any suggestion that this statement is good law, the Full Court held that it is not in a position to balance the social costs and public benefits of granting monopoly rights in respect of an invention; and that questions of this nature have already been resolved by the patent system which rewards innovation with a time-limited monopoly where the requirements of the Act are satisfied.\textsuperscript{394}

\footnotesize{rather different and controversial reasons which were largely ignored by both the judges and the parties on further appeal to the Full Court of the Federal Court.\textsuperscript{391} Ibid [43].\textsuperscript{392} Ibid [21].\textsuperscript{393} Ibid [20]. Branson J’s proposition was made in reliance on the following which she extracted from the High Court’s judgment in \textit{NRDC}: ‘a process, to fall within the limits of patentability which the context of the \textit{Statute of Monopolies} has supplied, must be one that offers some advantage which is material, in the sense that the process belongs to a useful art as distinct from a fine art – that its value to the country is in the field of economic endeavour.’: \textit{Grant v Commissioner of Patents} [2006] FCA 1100, [20] (Branson J citing National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 275 (citation omitted). What the High Court was referring to was a value to the country in the field of economic endeavour, as opposed to a value to the country in some other field, such as artistic or intellectual endeavour. The words used by Branson J, ‘to the country as a whole’ and a need for balancing social costs and benefits simply do not appear in the High Court’s judgment and there is no basis for reading them into the passage Her Honour extracted. Branson J’s opinion in \textit{Grant v Commissioner of Patents} is reminiscent of that of Sheppard J in \textit{Anaesthetic Supplies Pty Limited v Rescare Limited} (1994) 122 ALR 141, [58] (‘The grant of a patent in these circumstances seems to me to be generally inconvenient. It is not going too far, I think, to say that the Court should not contemplate the grant of letters patent which would give to one medical practitioner, or perhaps a group of medical practitioners, a monopoly over, for example, a surgical procedure which might be greatly beneficial to mankind. Its denial might mean the death or unnecessary suffering of countless people. I cannot think that this is really what the medical profession as a whole would seek to achieve.’).\textsuperscript{394} \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [45] (Full Court).}

318
With respect, Branson J’s opinion is contrary to established principles and displays a misunderstanding of the objects of patent law. Those objects do not require an analysis of the economic benefits of each and every patent examined. Instead those objects are met if economic incentives are made available to any anyone who produces an invention that is novel and sufficiently inventive. This sentiment was clearly expressed as early as 1785 in *Arkwright v Nightingale*.

We must never decide patent rights upon any idea of public benefit; a cause between two individuals cannot be determined upon consequential reasons, that it would be beneficial to the public that one should prevail. The law has established the right of patents for new inventions; that law is extremely wise and just.

Her Honour’s decision is at best a well-intentioned, but misguided attempt to strike out what appears to be an undesirable type of patent. The history of patent law would seem replete with inventions that would be of economic significance only to their inventor during the term of the patent. Further, Branson J’s argument ignores the fact that the method will be available to the country as a whole at the expiry of the patent when it falls into the public domain, or that the wider community may also benefit when an individual is granted a monopoly.

Finally, it must be asked, how could the patents office apply such a test? The Full Court dealt satisfactorily with this question when it said the courts are not in a position to balance the social cost and public benefits of an invention. The Full Court said that questions of this nature have already been resolved by the patent system which rewards innovation with a time-limited monopoly where the requirements of the Act are satisfied.

### B Analysis of the Grant Decision

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395 (1785) 1 Carp Pat Cas 38.
396 Ibid 47 (Lord Loughborough).
398 *Grant v Commissioner of Patents* [2006] FCAFC 120, [45].
1 The Physicality Requirement

It is asserted that the Full Court’s finding that the manner of manufacture test contains a physicality requirement contradicts the existing law it was bound to follow. While the Full Court’s observation that the patentability of an alleged invention that does not produce a physical effect or cause a transformation of matter has never been upheld may be accurate, it cannot necessarily be inferred that the law regards the absence of a physical embodiment as determinative of patent-ineligibility. That this observation might be made does not necessarily create a requirement, thus the Federal Court in Grant erred in relation to the physicality question when it observed a history of patentable inventions based in physical objects or physically-transformative methods, but it did not properly consider whether the concept of ‘manufacture’ is in fact limited in this way.

Instead, it is argued that the line of cases in which the concept of manufacture has developed over time demonstrate that physical effect or transformation is not relevant to the patentable subject matter inquiry. On the contrary, those principles show that the boundary between patentable subject matter and abstract ideas or principles is specific practical application, not physicality. Accordingly, it is argued that the Federal Court’s finding in Grant is not good law and should not be followed.399

The High Court in NRDC clearly left unresolved the question of whether some physical thing need be brought into existence or otherwise affected.400 In the course of its reasoning, the Full Court went from acknowledging that the High Court in NRDC left the question unresolved and that Heerey J in Welcome Real-Time v Catuity had been aware of, but had not needed to decide the question, to holding that the law involves a physicality requirement. The court did not adequately explain how it reached this conclusion.

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399 It should be noted that Grant is a decision of the Full Court of the Federal Court of Australia, which is a court that is bound to follow the decisions of the High Court of Australia, which sits above it in the Australian Federal court hierarchy. Thus, the Federal Court is bound by the precedent set by the High Court in NRDC.

400 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 270.
The court in *Grant* equated a lack of a physical aspect with the invention being only a scheme or plan for doing business or intellectual information. However, this is not a class of subject matter that is excluded from patent eligibility. While it may be a convenient description of subject matter that is not patentable, the true scope of what is patentable subject matter must be determined by reference to the NRDC principles. The characteristic of a ‘mere’ scheme or plan is that it is a concept without any practical application or means of being put into effect. This reasoning would appear to be inconsistent with the NRDC principles because it ignores the possibility that a non-physical method might produce a useful practical outcome.

Given that the High Court warned against denying patentability to certain classes of invention because this would be inconsistent with leaving the manner of manufacture concept open to new forms of invention, it is curious that the court would seek to impose a physicality requirement. This new requirement is an unnecessary and artificial fetter that is inconsistent with the manner of manufacture concept being able to adapt to unforeseen developments in technology. It may unfairly deny patentability to intangible inventions which otherwise fit within the concept of a manner of manufacture. As such, it is suggested that the Full Court erred in imposing a physicality requirement and instead should have held that the invention is patentable subject matter.

The Full Court’s failure to properly explain why it concluded that physical effect or transformation is required is an aspect of the decision that invites speculation. Perhaps it is possible that the court was uncomfortable with the nature of the invention or the consequences that would flow from allowing the patent and rendered a decision on unspecified policy grounds to deny patentability. If this were the case, it would be inconsistent with the view expressed by the Full Court of the Federal Court in *Anaesthetic Supplies Pty Limited v Rescare Limited*, that decisions of policy are to be resolved by Parliament rather than by the courts. In fact, the Full Court could have been instructed by its own words, which it used to reject Branson J’s suggestion that the economic utility of an invention need be for the benefit of the country as a whole. There, the court said:

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401 Monotti, above n 201, 477-478, 478-479 has come to same conclusion.
402 (1994) 122 ALR 141.
Nor is the Court in a position to determine the balance between social cost and public benefit. Parliament has already made that judgment, as its predecessor did in 1623, by rewarding innovation with time-limited monopoly.\textsuperscript{403} That the Full Court did not give an opinion as to whether there is a requirement that an invention be within the realm of science or technology in order to be patentable was a sensible approach for the court to take on the issue since it had already decided uphold the revocation on other grounds. However, it is significant that the court said that to impose such a requirement would risk imposing the kind of rigidity that the High Court in \textit{NRDC} warned against. Surely the court should have recognised that the approach it took is no different to the approach taken by the Deputy Commissioner, to strike a patent out because it lacked the application of science or technology.

The court paid insufficient heed to the economic consequences of its decision. The court has not considered how this decision affects, or is consistent with, the objects of patent law in this country to provide an incentive to would-be inventors to produce inventions in any field of technology. The effect the decision will have on innovation and innovation policy, the expectations of inventors (both those with existing patents and those would create non-physical inventions in the future) and the economy as a whole are not canvassed. By failing to recognised that the term ‘invention’ is of wider import than only innovations that involve a physical effect or transformation, and restricting the scope of patent eligible subject matter in this way, the Federal Court has excised an emerging area of technology from the incentives of the patent system. It has thereby harmed this nation’s capacity to advance technologically and its ability to compete with other nations in key emerging fields of technology that will undoubtedly provide the basis of competitive advantage in the Information Age. In doing so, it has failed to embrace the broad and flexible approach the law requires to be able to respond appropriately to new, exciting and unpredictable technological advances that the High Court mandated in \textit{NRDC}.

\textsuperscript{403} Grant v Commissioner of Patents [2006] FCAFC 120, [45].
As a result of the Federal Court’s decision in *Grant*, Australia as a nation will suffer. It will suffer because the scope of patentable subject matter is to be applied in a discriminatory fashion. It will suffer because inventions that do not produce a physical effect or cause a physical transformation of matter, which would otherwise be entitled to a patent, will be unpatentable. The consequence of economic incentives of the patent system now not being made available across all classes of invention, is that innovation will be stifled. Would-be inventors of non-physical inventions must now be satisfied with the incentives and risks that a competitive market will realise before they will disclose their inventions to the public, or even produce them in the first place. The court has thereby harmed this nation’s capacity to advance technologically and its ability to compete with other nations.

The court did not explain the degree to which its vaguely described physicality requirement must be present in an invention to allow it to be patentable. Obviously, a physical transformation of tangible and physical matter will satisfy this test, but it is not clear whether mere physical steps, such as those inherent in human movements or communications between humans would be covered. From what the court has said, seemingly any physical effect or transformation, no matter how trivial or how insufficiently appended to the method in question, will suffice. This test leaves many unanswered questions, such as whether claims over sporting manoeuvres, such as throwing a baseball or putting in golf would pass muster. An example of this type of thinking is evident from the fact that the court, without formally resolving the question, indicated that Mr Grant’s asset protection method might have been patentable subject matter had the patent specification required the use of a computer to achieve the desired result, since a computer is a useful result.

2. *The Patentability of ‘Legal Discoveries’*

The court held that methods of using the law to achieve a particular result, or ‘legal discoveries’ as it described them, are a class of invention that are not patentable, because they ‘would not be considered as having, in the words of NRDC, an
industrial or commercial or trading character,’ and are discoveries rather than inventions.404

The court conceded that the practice of law requires ingenuity and imagination, but did not explain why it would regard the use of ingenuity and imagination in legal practice as not being of a commercial character. This is difficult to understand as the practice of law is a profit-driven commercial enterprise. The law is largely a service-based profession which people use as a means of generating wealth. Surely innovative developments in the way law is applied that achieve a useful result that is of economic significance are of a commercial character and therefore ought to be encouraged by the reward of the monopoly protection afforded by a patent.

By categorising legal innovations as discoveries rather than inventions, the court did not recognise the distinction between a discovery of what the law is on a particular point and an inventive scheme that is a practical application of that discovery. While there can be no inventiveness in a mere discovery, a new practical application coupled with a mode of carrying it into effect will be patentable if it satisfies the heads of patentability in s 18. Here it is the practical application of that discovery, rather than the discovery that the law operates in a certain way, that Mr Grant seeks a monopoly in respect of. Accordingly, the patent should not have been revoked on the basis that it is a discovery.

It is curious that the court would have undertaken an analysis of this nature and have made the statement that all innovations in the practice of law are not patentable, not just those that do not produce a physical effect or cause a physical transformation of matter. The High Court in NRDC warned against denying patentability to certain classes of invention and the Full Court itself stated that it would not invalidate a patent merely because it is a business method. Given this, it would seem inappropriate that the court denied that an invention is patentable merely because it is a legal method. As the practice of law is a profit-driven commercial enterprise, surely innovative developments in the application of the law that achieve a useful result that

404 Ibid [34].
is of economic significance are of a commercial character and therefore ought to be encouraged by the reward of the monopoly protection afforded by a patent.

3 An Opinion as to How the Court Should Have Resolved the Manufacture Issue

In addressing the manner of manufacture issue, the court should have adhered to the principles for determining subject matter eligibility set out in NRDC. The High Court in NRDC said that the manner of manufacture test is to be applied flexibly and warned against the practice of denying patentability to certain classes of invention. It said that an invention must be a vendible product in the sense of it being an artificially-created state of affairs of economic significance and its value to the country must be in the field of economic endeavour. It must have an industrial, commercial or trading character. Further, it must offer some advantage that is material in the sense that it must be part of the ‘useful arts’ rather than the ‘fine arts’. The first step in the court’s approach should have been to acknowledge that the patentable subject matter test is a broad and flexible inquiry and that there are no fields of invention excluded from its reach. Employing this approach has led to courts finding patentable subject matter in other controversial areas of technology in the past, such as patents for agricultural and horticultural methods, methods of treating the human body, computer software, and methods that can be employed in a business.

It appears that Mr Grant’s asset protection method satisfies these criteria and is accordingly a proper subject of letters patent according to the principles which have been developed for the application of s 6 of the Statute of Monopolies. It is not a mere discovery, an abstract idea or scheme, or an unapplied principle. It is a man-made artificially-created state of affairs of economic significance. It is a process that is capable of producing a useful material advantage of specific practical utility, namely the protection of an entity’s assets from the claims of creditors. Thus, it is part of the ‘useful arts’ as distinct from the fine arts. It is sufficiently described and accordingly capable of repeated implementation by a person skilled in the art (say a lawyer) to

405 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252.
406 Joos v Commissioner of Patents (1972) 126 CLR 611.
produce predictable results each time it is implemented. It is of value to the country in the field of economic endeavour and it bears a ‘an industrial or commercial or trading character’. It provides a competitive advantage in the practice of law, or to other profit-driven commercial professional advisers charged with applying the law in ways that benefit their clients. It is a process that a consumer would be willing to pay for to have implemented on his or her behalf. The fact that the invention does not produce a physical effect or cause a physical transformation of matter is in no way relevant to whether it satisfies these criteria. 409

4 What If the Alleged Invention Had Involved a Computer?

According to the Full Court, one of the arguments raised by Mr Grant was that if the documents required to give effect to the process were produced by computer, the requirement that there be a physical phenomenon would be satisfied. 410 In response, the court indicated that the fact that computer software is capable of running on a machine is enough to satisfy the court’s physicality requirement. 411

It would appear that there are good reasons why Mr Grant did not claim the use of a computer as one of the integers of his patent. The first is that a computer is not really necessary to achieve the desired outcome of protecting all instantiations of the claimed asset protection method. The second is that to do so would have severely limited the scope of the monopoly to one which would only cover the use of the method as implemented by a computer. It would not protect in circumstances where a person sought to reproduce the asset protection structure without the assistance of a computer, say using pen and paper. What Mr Grant wanted was a monopoly to cover any use of his method. It would have been easy for a competitor to invent around the

409 It is not appropriate at this stage to consider the effectiveness of the scheme, that is, whether the application of the Bankruptcy Act 1966 (Cth) would allow the scheme to achieve the inventor’s aims. The question of whether the method is effective is a question of utility and therefore is not to be considered when considering whether the invention is a manner of manufacture, as the heads in s 18 are to be considered separately: Lockwood Security Products Pty Ltd v Doric Products Pty Ltd [2004] HCA 58, [43]-[46]; CCOM v Jiejing (1994) 122 ALR 417, 446.

410 Grant v Commissioner of Patents [2006] FCAFC 120, [28].

411 Ibid [32] (‘In Catusity and CCOM as in State Street and AT&T, there was a component that was physically affected or a change in state or information in a part of a machine. These can all be regarded as physical effects.’).
patent by simply using the method without making use of a computer in the manner specified by Mr Grant, or by not using a computer at all.

In any event, it is likely that a claim involving the use of a computer would not have been an essential integer of the invention, because the inventive element was in the structure of the transaction and would not reside in the involvement of a computer. Thus, the use of a computer would amount to post- or extra-solution activity.412 This would leave only the intangible process to consider in an infringement action or challenge to the validity of the patent. So, even if Mr Grant had included the use of a computer in his invention, the court would have in all likelihood struck out the patent on the same grounds.

The contrary view has been expressed by Charles Lawson,413 who stated that it is difficult to imagine that Grant’s invention would not also have required a computer to operate and therefore should have been patentable in the same way that the inventions in *CCOM v Jiejing* and *Welcome Real-Time SA v Catitude Inc* were considered patentable. With respect, since Grant’s claims to the asset protection method did not specifically claim the use of a computer, this is not an integer that can be read or inferred into the invention. To do so would be contrary to established notions of claim construction.

5 *Novelty, Inventiveness and the Threshold Requirement of ‘Invention’*

If the alleged invention considered in *Grant* is in any way an undesirable candidate for the award of a patent monopoly, it is because it claims something done before or something a lawyer would consider obvious. It is the strictures of novelty and inventive step, and the threshold requirement that an ‘invention’ be disclosed on the face of a patent application that come into play to address these concerns, not patentable subject matter. However, proving a lack of novelty or inventive step in this situation can be problematic. The difficulties are that documents which anticipate a legal innovation are generally not made publicly available, often because there is no

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412 For the applicability of ‘post-solution activity in Australian law, see McEniery, ‘Storyline Patents’ above n 236, 306.
413 Lawson above n 368, 640-641.
perceived benefit in publishing them or they are the subject of legal professional privilege. A further problem is that it is difficult to evidence the experience and knowledge of practising lawyers by reference to documents and acts, not common sense.

That the court did not identify any documentary evidence anticipating the alleged invention makes it arguable that its revocation on the basis of a lack of novelty is open to challenge. However, there is merit in cutting the invention off at the threshold, not as a matter of patentable subject matter, but on the basis that the applicant may have claimed only a non-obvious collocations of known integers. That is, there may not have been, as the court indicated, an ‘invention’ disclosed on the face of the application as required by the opening words to s 18. It is a shame that the court did not expand further on this issue, as it may have been a persuasive way to dispose of Grant’s alleged invention without making reference to physicality.

6 Implications of the Grant Decision

Regardless of whether the Full Court’s reasoning in Grant can be reconciled with the existing law or is a desirable outcome, it is now the case in Australia that a method must produce a physical effect or cause a physical transformation of matter to be patentable, since Grant’s application for leave to appeal to the High Court was refused. This means that pure business methods and other non-physical inventions cannot be patented in Australia until the High Court or the Full Court of the Federal Court overturns the decision. Professor Monotti supports this view.

As the requirement for this physical effect reflects the development of the law to this point, as opposed to a binding principle, there is no reason why later courts must accept that principle as immutable.

414 Grant v Commissioner of Patents [2006] FCAFC 120, 39.
416 Grant v Commissioner of Patents [2007] HCA Trans 126 (Hayne J).
417 Monotti, above n 201, 478.
The outcome in Grant, while arguably not the outcome the court ought to have reached, is unsurprising, as historically, controversial subject matter, such as computer software, methods of medical treatment for humans and inventions for the creation of living micro-organisms met initial resistance, mainly in patent offices, before being accepted as being suitable for the grant of a patent. What remains to be seen is whether the law in Australia will bend to allow patents over the intangible ‘products’ that new technology will invariably thrust upon us, or whether it will remain resilient in its denial.

As a consequence of the Grant decision, Australia, along with the United States (by virtue of its machine-or-transformation test), is arguably in breach of Article 27.1 of the TRIPS Agreement. Article 27.1 of the TRIPS Agreement demands that ‘patents shall be available for any inventions, whether products or processes, in all fields of technology’. It would seem that this provision does not permit the exclusion of non-physical inventions.

V LESSONS TO BE TAKEN FROM UNITED STATES LAW

As the most technologically developed and possibly litigious industrialised nation on Earth, the United States has a more evolved and complex patent jurisprudence than our own. As such, there is much we can learn from United States law and practice. Accordingly, an Australian approach that involves adapting United States law to local conditions may be helpful to resolve the physicality requirement question.

Despite the United States patent law having a different historical source owing little to the Statute of Monopolies, the Australian and United States patent laws are remarkably similar. The two countries have broad, flexible and inclusive subject matter tests. Both systems recognise that the incentive theory is the dominant theory

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418 Marrakesh Agreement Establishing the World Trade Organization, opened or signature 15 April 1994, 1867 UNTS 3, annex 1C (Agreement on Trade-Related Aspects of Intellectual Property Rights) (entered into force 1 January 1995). Art. XVI.4 of the World Trade Agreement stipulates that ‘[e]ach Member shall ensure the conformity of its laws, regulations and administrative procedures with its obligations as provided in the annexed Agreements’ of which the TRIPS Agreement is one. In January 1995, the World Trade Agreement 1995 (‘WTA’) came in operation and the World Trade Organisation (‘WTO’) was formed. The TRIPS Agreement is one of a number of associated agreements of the WTA.
of patent law that justifies the existence of the patent system and both recognise that it is the role of patent law to promote the progress of ‘useful arts’, either as a constitutional requirement, as in the United States, or as a common law principle, as in Australia. As a result, the Australian courts have proven more than willing to follow the direction provided by United States courts in the area of patent law.  

A The Recognised Categories of Excluded Matter

The most important lesson we in Australia can take from United States jurisprudence is that it is the recognised categories of excluded matter that pinpoint the dividing line that separates patent eligible and non-patent eligible subject matter, not physicality. While the United States courts are unlikely to comprehensively explain the scope of the recognised categories of excluded matter, it is clear that patent eligibility hinges on the distinction between discoveries and what is created as a result of human ingenuity, and the distinction between the abstract and what has been reduced to practice. It is also clear to the principle that the test for determining patent eligibility does not, and must not, discriminate between different classes or categories of invention.

It is argued that the recognised categories of excluded matter in Australia are identical to those recognised in the United States. This is consistent with the broad and flexible notion championed in NRDC that eligible subject matter can be described as

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419 The Federal Court in CCOM v Jiejing (1994) 122 ALR 417, 449 (Spender, Gummow and Heerey JJ) cited with approval International Business Machines Corporation’s Application (IBM’s Application) [1980] FSR 564, 572 in which Burchett J endorsed Diamond v Diehr, 450 US 175 (1981) and relied on other United States Supreme Court and CCPA decisions. Heerey J stated in Welcome Real-Time v Catuity Inc [2001] FCA 445, [129] that he had found the Federal Circuit decision in State Street persuasive, despite the United States patentable subject matter test being different to that used in Australia and the United States patent law having a different historical source owing little or nothing to the Statute of Monopolies. The Full Court of the Federal Court in Grant [2006] FCAFC 120, [21]-[23] relied on and cited with approval the United States cases in State Street, In re Alappat, 33 F.3d 1526 (Fed Cir 1994) and Diamond v Diehr. Reference is made to the applicability of United States law to Australian conditions in Grain Pool of Western Australia v Commonwealth of Australia (2000) 202 CLR 479, 497.

420 The recognised categories of excluded matter are explained most clearly by the United States Supreme Court as being fundamental principles, natural phenomena and abstract ideas: Gottschalk v Benson, 409 US 63, 67 (1972); Parker v Flook, 437 US 584, 589 (1978); Diamond v Chakrabarty, 447 US 303, 309 (1980); Diamond v Diehr, 450 US 175, 185 (1981).
a ‘vendible product’, where product is taken to cover every end produced, and vendible is taken to point only to the requirement of utility in practical affairs.421

B A Physicality Requirement is Not Good Law

Both countries’ patent laws currently have a physicality requirement that is inconsistent with existing precedent and the rationale that both systems exist to serve. Both countries are arguably in breach of their obligations at international law under the TRIPS Agreement as a consequence. As explained in chapter 3, Newman J’s dissent in *Bilski* demonstrates that the Federal Circuit’s machine-or-transformation test is not supported by the statutory language of § 101, is inconsistent with existing Supreme Court precedent, fails to keep pace with changes in new technologies and ties patent eligibility to a bygone era. As far as non-physical methods are concerned, the Australian courts ought to follow the lead of Newman J, rather than the *Bilski* majority, and reject any physicality requirement.

If the Australian courts are to persist with a physicality requirement, they should at least be guided by the Federal Circuit, which has provided a more sophisticated and considered approach to the issue by way of the machine-or-transformation test. The majority in *Bilski* explicitly stated that its machine-or-transformation test is not a requirement that a process disclose physical steps.422 Probably the most interesting aspect of the Federal Circuit’s physicality requirement is that the transformation part does not necessarily refer to a transformation of physical matter. In this regard, the court recognised that the types of transformation permitted include those ‘representative of physical objects or substances’ and would include ‘an electronic signal representative of any physical object or substance.’423 What is troubling, is that it is difficult to see why a transformation of raw data representative of physical objects that does not involve any transformation of the underlying physical objects themselves would be sufficient, when a transformation of data not representative of physical objects would not. For instance, it is difficult to see why a method of converting data representing a human heart rate into a form that can easily be

422 In re Bilski, 545 F.3d 943, 961 (Fed. Cir. 2008) (en banc).
423 Ibid 964-965.
understood by a human being, say as a line graph, should be treated differently to a similar method of converting data representing price data analysis.

Finally, the Federal Circuit’s rejection of the State Street approach to determining patentable subject matter, the ‘useful, concrete and tangible result’ test, must cause the Federal Court some embarrassment, as it endorsed that now defunct approach as good law. After the Federal Circuit’s about-face, the Federal Court of Australia can no longer endorse the State Street ‘useful, concrete and tangible result’ test and must now, as its counterpart in the United States has done, reject the State Street formula as being ‘insufficient to determine whether a claim is patent eligible’. Alternatively, the court must clarify its endorsement by saying that it approved of the approach Rich J took in applying the existing Supreme Court precedent in State Street, rather than the use of the words, ‘useful, concrete and tangible result’.

C United States Decisions Involving ‘Manufactures’

The concept of ‘manufacture’ forms part of United States law as a consequence of being one of the four enumerated categories of subject matter in 35 USC § 101. It would appear that the statutory category of ‘manufacture’ is the same concept described in the Statute of Monopolies as it existed in 1789, as it was arguably intended to incorporate into United States practice as much of the common law interpretation of ‘new manufactures’ as was then understood.

Two competing views as to the scope of manufactures under United States law are found in the decision of In re Nuijten. The first is that of Gajarsa J, who on behalf of the majority, considered that the term ‘manufacture’ (as a noun) refers to ‘tangible articles or commodities… resulting from the process of manufacture’, meaning

\[\text{Ibid 959-960.}\]
\[\text{In re Bilski, 545 F.3d 943, 959-960 (Fed. Cir. 2008).}\]
\[\text{It would appear that Congress broadened the field of patent eligibility from ‘new manufactures’ to ‘useful arts’ to avoid the possible complication that the English phrase was unduly limited.}\]
\[\text{In re Nuijten, 500 F.3d 1346 (Fed. Cir. 2007). See above Chapter 3, Part IV J.}\]
‘articles’ made by man that have a physical embodiment.\textsuperscript{430} In contrast is the more expansive view of the dissenting judge, Linn J, who found that physicality is of no relevance to the § 101 statutory category of ‘manufacture’.\textsuperscript{431} Arguably, Linn J’s more expansive view ought to win out, both in Australia and the United States. It should win out because it is consistent with the broad, flexible and inclusive notions of patentable subject matter that have existed in both countries for many years, and is consistent with the object of patent law to provide incentives to innovate in all fields of technology.

D Insignificant ‘Post-Solution’ or ‘Token’ Physical Activity is Not Sufficient

There is an obvious temptation on the part of patent attorneys and patentees to attempt to avoid an invention being declared a mere abstract idea by adding a physical element in order to give the invention claimed some material form, even if that material form is not integral to the innovative breakthrough claimed. In other words, the temptation is to pass off an unpatentable abstract idea as a patentable invention by appending a physical structure to it.

While the law in Australia does not provide much, if any, guidance on the acceptability of this strategy, United States law does. In the United States, adding ‘insignificant post-solution activity’ to otherwise unpatentable subject matter will not make that subject matter patentable. The principle requires that the invention, being the advance over the prior art made by the inventor, be identified and extracted from any extraneous material contained in the description of the invention or claims that would otherwise confuse the reader as to the true scope of the inventor’s contribution to the state of the art. Doing so avoids improperly approving a patent over any of the excluded categories of subject matter, even if only within a limited field of use.\textsuperscript{432}

Such a principle would be a necessary and sensible addition to Australian law that would assist patent examiners and the public distinguish deserving inventions from


\textsuperscript{431} Ibid 1358 citing \textit{Diamond v Chakrabarty}, 447 US 303, 308 (1980) and \textit{American Fruit Growers, Inc. v Brogdex Co.}, 283 US 1, 11 (1931).

\textsuperscript{432} \textit{Parker v Flook}, 437 US 584, 590 (1978) affirmed \textit{In re Bilski}, 545 F.3d 943, 962 (Fed. Cir. 2008); \textit{Diamond v Diehr}, 450 US 175, 193 n 14, 191-192 (Rehnquist J), 215 (Stevens J)
claims made upon artful drafting that are not deserving of a patent monopoly. It would help defend against artful claims that would seek to privatise unpatentable principles and laws of nature by simply appending a physical device to uses of those natural phenomena.433

VI IS A TECHNOLOGICAL CONTRIBUTION REQUIRED?: THE ‘USEFUL’ OR ‘TECHNOLOGICAL’ ARTS AND INDUSTRIAL APPLICABILITY

A ‘Useful’ or ‘Technological’ Arts

Even though there is no constitutional useful arts limitation in Australian law, or an express limitation to that effect in the Patents Act 1990 (Cth), there is a common law useful arts requirement in Australian patent law.434 The High Court in NRDC said as much when it held that to be patentable, an invention must offer some advantage that is material in the sense that it must be part of the ‘useful arts’ rather than the ‘fine arts’.435 The effect of the limitation is that only new and useful technological advances of specific practical application are patentable subject matter. As explained above,436 the useful arts are thus synonymous with technology, which is a broad term that is coextensive with all new and useful technological advances made by human beings that achieve specific practical outcomes. By ‘technological advances’ what is meant is innovation that is not strictly of an aesthetic character or within the realms of fundamental principles of nature, natural phenomena or abstract ideas.

William van Caenegem has suggested that the ‘manner of manufacture’ test embodies a ‘technicality requirement’. He has put forward the view that a patent ought only be

434 National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 275 (to be patentable an invention must offer some advantage that is material in the sense that it must be part of the ‘useful arts’ rather than the ‘fine arts’); Rolls-Royce Limited’s Application [1963] RPC 251, 253 (‘this in my judgment is as much outside the operation of any of the useful arts as would be a trainer’s direction to a jockey in his control of a racehorse’), 255 (Lloyd-Jacob J); Re Virginia-Carolina Chemical Corporation’s Application (1958) RPC 35, 36 cited in National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 275; Re Cooper’s Application for a Patent (Cooper’s Application) (1901) 19 RPC 53, 54 (Sir Robert Finlay A-G) (‘a man could not ask for a patent to be granted to him for a literary composition. That, if anything, would be the subject of copyright. In order to ask for a Patent a man must come forward saying that he has some invention with reference to manufacture.’); Maeder v Busch (1938) 59 CLR 684, 705 (Dixon J) (obiter) (‘To be patentable an invention must relate to an art.’).
436 See above Chapter 3, section VA.
 awarded for technological innovation that gives a technological result, which is a requirement that excludes organisational, business, theoretical or scientific innovation as such from patent eligibility.437

It would be fair to conclude that in NRDC, the grant of patents is still limited to technological innovation, and does not extend to organisational, business, theoretical or scientific innovation as such.438

This argument is that the need for an invention to be an artificially-created state of affairs limits the scope of what can be patented to technological innovations, on the understanding that ‘technology’ is the practical application of knowledge or a manner of accomplishing a task using technical processes, methods or knowledge.439 Thus, the idea of a technicality requirement confines patentable subject matter to processes and products that have a practical effect and excludes unimplemented theoretical knowledge. This is consistent with the principle that patent law in Australia exists to promote the progress of all useful arts.

However, it cannot be said that patent eligibility ‘does not extend to organisational, business, theoretical or scientific innovation as such’,440 unless that statement refers only to innovation in these classes that has not been reduced to a specific useful practical application. To say otherwise would not be consistent with the principle that patent law in Australia exists to promote the progress of all useful arts. If we have learnt anything from NRDC and the cases that follow it, it is that excluding categories of subject matter from patent eligibility is not what the court intended.

A related argument is that of the Deputy Commissioner of Patents who relied on a technology-based test in revoking Mr Grant’s innovation patent prior to the matter

438 Ibid 41 (citations omitted) (emphasis in original). By ‘scientific innovation’ it appears that van Caenegem means that ‘scientific discoveries are not directly patentable as such’ and that science-related claims must be limited to a specific practical application which satisfies the element of inventiveness, rather than being claims to mere scientific principles or discoveries.
439 Ibid.
440 van Caenegem, above n 437, 41.
being heard by the Federal Court. The test the Deputy Commissioner relied on was that, in order to be patentable, a method claim must involve the application of technology based on the laws of nature.\textsuperscript{441} The Deputy Commissioner justified this test on the basis that he considered that the history of the concept of manner of manufacture has consistently involved either the discovery of laws of nature or the application of technology based on the laws of nature. He expressed concern that there might be no meaningful limits on the scope of patentable subject matter if such a test were not observed, and revoked the patent on the basis that the invention does not disclose either of these elements.\textsuperscript{442}

The same Deputy Commissioner rendered a decision in another matter which involved a patent over a legal method, \textit{Re Peter Szabo and Associates Pty Ltd}.\textsuperscript{443} The subject matter in that case was a method of releasing equity in real property using a reverse mortgage to provide security for and a means of repaying a loan. Once again, this is an invention that makes use of the laws of Australia that does not produce a physical effect or cause a physical transformation of matter. With reasoning similar to that which he used in respect of Mr Grant’s application, the Deputy Commissioner revoked this patent because it does not involve the application of ‘science and technology’ and does not involve the application of a law of nature.\textsuperscript{444} To support this reasoning, he sought to read into the \textit{NRDC} decision a requirement that an invention must involve the application of ‘science and technology’ in order to be an artificial state of affairs, rather than just the involvement of human endeavour in any form.\textsuperscript{445} Those views of the Deputy Commissioner were rejected by the Full Court in \textit{Grant}. We think that to erect a requirement that an alleged invention be within the area of science and technology would be to risk the very kind of rigidity which the High Court warned against.\textsuperscript{446}

\textsuperscript{441} Stephen John Grant [2004] APO 11, [25].
\textsuperscript{442} Ibid [25]-[28].
\textsuperscript{443} Re Peter Szabo and Associates Pty Ltd [2005] APO 24.
\textsuperscript{444} Ibid [61]-[62].
\textsuperscript{445} Ibid [36]. There was very little in the Deputy Commissioner’s decision to justify this view, other than the assertion that this what the manufacture concept, as it has evolved over time, has required.
\textsuperscript{446} Grant \textit{v Commissioner of Patents} [2006] FCAFC 120, [38].
Finding support for a ‘useful arts’ limitation within the concept of ‘manufacture’ requires two findings. The first is that the history of ‘manner of manufacture’ reveals that only patents of this nature have been upheld. The second is that the concept of ‘manufacture’ is in fact limited to advances of this nature and that other advances are not encompassed within the concept. This second finding is much more difficult as it requires a comprehensive knowledge of the objects of patent law and the nature of the innovation policy enshrined in section 6 of the Statute of Monopolies. The first finding is merely based on an observation of history. That this observation might be made does not necessarily create a requirement because it does not necessarily speak to the future and is restricted by the history of technology. This is where the Federal Court in Grant erred. It observed a history of patentable inventions based in physical objects or physically-transformative methods, but it did not properly consider whether the concept of ‘manufacture’ is in fact limited in this way.

NRDC is authority for the proposition that Australian law does contain a common law ‘useful arts’ limitation. The limitation is consistent with the ‘manner of manufacture’ concept within the meaning of section 6 of the Statute of Monopolies and exists within Australian law by virtue of the nature and scope of technology that has been recognised as patentable subject matter over time. The effect of the limitation is that only new and useful technological advances of specific practical application are patentable subject matter. Subject matter that is excluded from patent eligibility includes: that which lies within the ‘fine arts’ rather than the ‘useful arts’; that which is naturally occurring rather than occurring as a result of the direct involvement of human ingenuity; and that which is essentially non-economic, or lacking in practical application. Thus, that it is argued that the concept of ‘invention’, as recognised in Australian patent law, is coextensive with a broadly defined understanding of ‘technology’.

Whether a future Australian court confirms that a useful arts requirement involves a physicality requirement, or a requirement that an invention involve the application of science or technology, remains to be seen. Even though the Full Court in Grant rejected the assertion that the law requires that a patent involve the application of science or technology, there is nothing to guarantee that the High Court of Australia
or the Federal Court in the future would necessarily concur with this view. Importantly, the existence of a useful arts or technological arts requirement does not imply that an invention must produce a physical effect or cause a physical transformation of matter to be patentable as the scope of ‘technology’ is broader than this. It is possible that a non-physical technological development may be a new product or process of practical utility.

**B Industrial Application**

Without being introduced into legislation, it is unlikely that a standard of industrial application like that observed in Europe and the United Kingdom would find favour in Australia. Given that the High Court in NRDC held that an invention should be more broadly regarded as being of an ‘industrial or commercial or trading character’, limiting the patentable subject matter inquiry to inventions of industrial application would appear to be inconsistent with the view set down in NRDC that an invention will be patentable subject matter if it is a ‘vendible product’. At best, industrial innovation is one class of technology encouraged by the patent system, not its exclusive domain.

The words, ‘industrial application’, also appear in the TRIPS Agreement. Article 27.1 of the TRIPS Agreement requires that all member states of the World Trade Organization ensure that ‘patents shall be available for any inventions, whether

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447 Interestingly, the Federal Court of Australia in Grant has already given implicit support to technological innovation forming the basis of the test (albeit without giving much attention to the issue). While referring to the decision of Heerey J in Welcome Real-Time v Cauty Inc, the Full Court said, ‘His Honour drew a distinction between a technological innovation which is patentable and a business innovation which is not.’: Grant v Commissioner of Patents [2006] FCAFC 120, [24] citing Welcome Real-Time SA v Cauty Inc [2001] FCA 445, [128].

448 The ‘industrial application’ test and the exclusion of particular categories of subject matter have found statutory form in Europe and the United Kingdom by virtue of Article 52 of the European Patent Convention, which is implemented in United Kingdom law by section 1 of the Patents Act 1977 (UK).


450 Ibid 275-277.

451 Richard S Gruner, ‘Intangible Inventions: Patentable Subject Matter for an Information Age’ (2002) 35 Loyola of Los Angeles Law Review 355, 375. van Caenegem, above n 437, 41 equates a ‘technological arts’ requirement with industrial applicability. It may be that industrial activities are not necessarily identical to technological activities, but may instead be a narrower subset of the technological arts.
products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.’ The term, ‘industrial application’, is used here in a narrower sense than its ordinary meaning would provide. A footnote to the text of Article 27.1 states that for the purposes of Article 27.1, the terms ‘inventive step’ and ‘capable of industrial application’ may be deemed by a member state to be synonymous with the terms ‘non-obvious’ and ‘useful’ respectively.452

Were an industrial applicability standard to be adopted by the legislature, it would potentially limit the scope of patent eligible subject matter in this country, depending on how it were interpreted by the courts. A narrow interpretation consistent with the meaning given in the footnote to the text of Article 27.1 would not alter the existing law in Australia. A broader interpretation might remove many commercial and business methods from patent eligibility. If the legislature were to adopt this, it could limit the role and effect of patent law within the national innovation framework to industrial activities, a limitation inconsistent with the broad notions championed in NRDC. However, even if patent eligibility were limited to industrial or manufacturing processes or the products of such processes, this would not imply the existence of a physicality requirement, as there are non-physical products of industrial or manufacturing processes that are susceptible and worthy of patent protection.453

VII THE REMAINING STRICTURES OF PATENTABILITY

There is a wealth of literature coming out of the United States, in both the case law and academic commentary, that supports the view that it is not the patentable subject matter test that is the appropriate means of avoiding rewarding undeserving subject matter with the grant of patent, but the remaining strictures of patentability, such as novelty, non-obviousness and the need to describe the invention sufficiently. That literature suggests that it is these remaining strictures of patentability that are in fact the focus on the patentability, rather than subject matter concerns.

452 A different meaning is used in the United Kingdom: the Patents Act 1977 (UK) s 4 provides that an invention shall be taken to be capable of industrial application if it can be made or used in any kind of industry, including agriculture, unless it is a method of treating a human or animal body by surgery, therapy or diagnosis.

453 For examples, see In re Nuijten, 500 F.3d 1346 (Fed. Cir. 2007) and Re an Application for a Patent by Henry Barnato Rantzen (Rantzen’s Application) (1946) 64 RPC 63 (PAT).
This concept has a long history in Anglo-Australian law. It has been said that a careful reading of the judgments of the English courts for the first 200 years following the Statute of Monopolies discloses that all, as far as patent validity is concerned, were based upon lack of novelty, lack of utility, or insufficiency of specification, rather than subject matter. In Grain Pool, it was also noted that: ’[i]n the note of the reporter, Webster, to the report of Crane v Price [(1842) 1 Webster’s Patent Cases 393, 409, note (e)], decided by Tindal CJ in 1842, it had been said that:

“It may be observed, that no case is reported or mentioned in any of the books in which a patent has failed, simply on the ground of the invention not being the subject-matter of letters patent; some other ground, as want of novelty, or defective specification, having been the real cause of failure.”

In 1894, Lord Esher MR, in The Edison Bell Phonograph Corporation, Limited v Smith and Young, responded to a submission that one of the claims of the patent in suit was wanting in subject-matter by saying:

Now, whenever I hear the objection taken to a patent which has been used, which has been bought and sold, which has been therefore treated by men of business as a useful thing, that it is wanting in subject-matter, I look upon it, I confess, with an amused contempt. ...

It really comes to this, that although the invention is new - that is, that nobody has thought of it before - and although it is useful, yet, when you consider it, you come to the conclusion that it is so easy, so palpable, that everybody who thought for a moment would come to the same conclusion; or, in more homely language, hardly judicial, but rather businesslike, it comes to this, it is so easy

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455 Ibid 503.
456 (1894) 11 RPC 389.
that any fool could do it. Well, I look, as I say, upon that objection, when all others have failed, generally with amused contempt.\textsuperscript{457}

Allowing patents over non-physical inventions is not a case of ‘odious’ monopolies being granted in respect of subject matter already available in the public domain. Allowing new non-physical methods in no way dispenses with the need to test for the remaining standards of newness, novelty, non-obviousness, utility and adequate disclosure.

What this approach requires is that the strictures of patentability other than patent eligibility be properly applied when the decision to grant a patent, or uphold the grant of a patent, is made. This demands that the patent office and courts must take care when applying the novelty and non-obviousness standards. They must do their best to ensure that patents are granted only when what is claimed is not disclosed in the prior base. Further, they must ensure that patents are granted only where actual inventiveness is involved, rather than just the application of a process known in one field of endeavour in another. This addresses a genuine concern that people have with business method and computer software patents, namely that they interfere with the right to conduct activities that are obvious based what has already been disclosed in the public domain. Anyone who can implement a method to achieve a non-infringing and functionally equivalent useful result by different means, say by creating software that is coded to follow a different process, or adopts a different operating method that contains different steps, should be safe in the knowledge that they will escape infringement. If this does not occur, the public will have little faith in the competence of the system.

As has been shown above,\textsuperscript{458} there is no basis for seeking to rely on the threshold requirement of inventiveness as a means of cutting down non-physical inventions that would not necessarily fail to satisfy the remaining patentability requirements. The threshold requirement of inventiveness is simply an expedient means by which the patent office, or a court, can strike out an application on the basis that it would certainly not meet the statutory requirements for patentability, without the need to

\textsuperscript{457} Ibid 398.
\textsuperscript{458} See above Part II.B.6.
compare the alleged invention with the prior art. In other words, if it is apparent on
the face of the specification that the qualities of newness and inventiveness necessary
are absent, there is no need to adduce evidence of a prior art base.

It was also shown that a court could not rely on the threshold requirement to rule on
normative grounds that a particular invention is of a class that the court does not
believe should be within the scope of patentable subject matter. As such, the
threshold requirement of inventiveness would not appear to be a means by which all
non-physical inventions could be denied patentability at the threshold without due
consideration of the merits of the invention claimed. Instead, in applying the
threshold requirement, the courts are limited to an investigation as to whether there is
an admission on the face of the specification that the alleged invention discloses only
a discovery of something that already exists or something that is known in the
relevant field.

VIII CONCLUSION

A The Patentable Subject Matter Test in Australia

This chapter has focused on the fact that the Australian patentable subject matter test,
the ‘manner of manufacture’ test, is a broad, flexible, inclusive and technology-
neutral standard. It recognises that the products of technological innovation will
always be ‘excitingly unpredictable’;459 and that a broad and flexible approach is
needed to appropriately recognise and protect new and emerging technologies.

The High Court in NRDC explained that to be ‘a manner of new manufacture’, an
invention must be of an ‘industrial or commercial or trading character’460 and ‘must
be one that offers some advantage which is material’,461 in the sense that it must be
part of the ‘useful arts’ rather than the ‘fine arts’. The court said that an invention
must be a ‘vendible product’ where ‘product’ covers ‘every end produced’ and

460 Ibid 275 citing Re Lenard’s Application (1954) 71 RPC 190, 192 (Lloyd-Jacob J).
461 Ibid 275.
‘vendible’ points ‘only to the requirement of utility in practical affairs’. An invention will be a ‘vendible product’ if it is an ‘artificially created state of affairs’, and ‘its value to the country is in the field of economic endeavour’. The only subject matter excluded from patent eligibility, other than that listed in the statute, is that which falls within the recognised categories of excluded matter, namely, fundamental principles of nature, natural phenomena and abstract ideas.

Thus, the Australian patentable subject matter test recognises as patent eligible any new and useful invention that falls within the ‘useful arts’, but lies outside the recognised categories of excluded matter. In this sense, the Australian patentable subject matter test is consistent with that used in the United States.

**B The Better View: There is No Physicality Requirement in Australian Law**

In *Grant*, the Full Court of the Federal Court of Australia held that Australian patent law contains a physicality requirement. There are good reasons that support the view that *Grant* was wrongly decided and that the physicality requirement introduced is not good law. The finding in *Grant* that the history of the patent system and the concept of manufacture point to a physicality requirement is not supported by the cases. The physicality requirement is inconsistent with the concept of manufacture as it has developed over time and the NRDC requirement that the patentable subject matter inquiry be broad and flexible enough to accommodate excitingly unpredictable new emerging technologies as they arise.

The history of patentable subject matter in Anglo-Australian jurisprudence has been a troubled one. The courts have struggled with the concept of manufacture and have arguably closed off many fields of technology on subject matter grounds without understanding the virtue of an unfettered subject matter inquiry. While it has traditionally been thought that patents are the exclusive domain of engineering, applied science and industrial manufacturing, the scope of patentable subject matter is

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462 Ibid 276.
463 Ibid 277.
465 *Patents Act 1990* (Cth) s 18(2) (‘Human beings and the biological processes for their generation’). See above n 23.
not in fact limited in this way. A survey of the cases in which the concept of manufacture has been considered since the passing of the Statute of Monopolies in 1623 and dating back to cases such as Boulton and Watt v Bull and The King v Wheeler reveals that non-physical methods, as a class of invention, are not excluded from patent eligibility. Instead, those cases reveal that the test for determining whether an invention is patent eligible subject matter is a broad and flexible one that does not arbitrarily discriminate against classes of invention, even those that do not produce a physical effect or cause a physical transformation of matter.

While the Federal Court may have observed that, prior to the decision in Grant, no case had ever upheld the validity of a non-physical invention, it could equally be observed that no patent had ever been rejected by a court on subject matter grounds on the basis that the invention lacked a physical element. As such, there is no precedent that definitively states that the common law contains a physicality requirement. Instead, the cases show that the presence of a physical effect or transformation of matter is merely an example of one form that patentable subject matter may take, rather than an invariable requirement. Like the cases in the United States, the Australian and pre-1977 British cases make repeated reference to physical artifacts and physically-transformative methods as examples of subject matter that may be patentable, rather than a prerequisite to patent eligibility.466 If an alleged invention discloses a significant effect or transformation it will be considered definitively to lie within the bounds of patentable subject matter. If it lacks a sufficient degree of physical embodiment, other enquiries will need to be made to determine whether it is merely an abstract idea or falls within one of the other excluded categories of subject matter. Thus, the dividing line between patentable inventions proper and mere abstract ideas is not physicality. Rather, that dividing line is marked by the recognised categories of excluded matter. This outcome is consistent with the better view of how the relevant law in the United States ought to be interpreted.

466 See for example King v Wheeler (1819) 2 B & Ald 345; 106 ER 392, 394-395; Re C & W’s Application (1914) 31 RPC 235, 235-236; National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 276.
There is no basis for finding that a non-physical invention is not patentable subject matter on general inconvenience grounds, merely because it does not produce a physical effect or cause a physical transformation of matter. As has been explained, general inconvenience is an historical vestige of the Statute of Monopolies, that relates to novelty, not public policy. The concept of general inconvenience is directed to preventing the grant of ‘odious monopolies’ that interfere with existing industries and trades. The general inconvenience principle is that the limitation of patents to ‘new manufactures’ meant they could not be applied to the production of known items or over existing trades and industries, since to do so would cause the public intolerable inconvenience and injustice. As such, general inconvenience is not an avenue by which courts can exclude subject matter on public policy, public interest, morality, or other extra-legal considerations.

Accordingly, it is argued that the line of cases in which the concept of manufacture has developed over time demonstrate that physical effect or transformation is not relevant to the patentable subject matter inquiry. On the contrary, those principles show that the boundary between patentable subject matter and abstract ideas or principles is specific practical application, not physicality. Accordingly, it is argued that the Federal Court’s finding in Grant is not good law and should not be followed.467

Despite strong arguments that Grant was wrongly decided, the decision now represents the state of law in Australia. As in the United States, we in Australia must suffer the imposition and embarrassment of an ill-conceived physicality requirement until the decision is overturned by the High Court or Full Court of the Federal Court. As a consequence, Australia, along with the United States, is arguably in breach of Article 27.1 of the TRIPS Agreement, which requires that ‘patents shall be available for any inventions, whether products or processes, in all fields of technology’.

C The Degree of Physical Effect Required is Unclear

467 It should be noted that Grant is a decision of the Full Court of the Federal Court of Australia, which is a court that is bound to follow the decisions of the High Court of Australia, which sits above it in the Australian Federal court hierarchy. Thus, the Federal Court is bound by the precedent set by the High Court in NRDC.
Even if the physicality requirement in *Grant* were to remain part of the legal landscape, it is still open to criticism. The vague language of the decision does nothing to promote legal certainty as it does not explain what sort or degree of physical effect or transformation is sufficient for an invention to be considered patentable subject matter. If the physicality requirement in Australian patent law is to be confirmed, the courts must do a better job of explaining what degree of physical effect is required and what counts as a physical transformation than the Federal Court in *Grant*.

From the court’s language it is clear that a new type of engine, or a new method of causing a chemical reaction that has a useful economic purpose, is clearly patentable subject matter. What is not clear is whether a process that only discloses physical steps is patentable subject matter. A process that only discloses physical steps is one that does not involve a machine or cause a transformation of matter, but instead only involves movement of a physical object. It is equally unclear how the court’s physicality requirement applies to the patentability of computer software, which the court has earlier held to be patentable. Similar ambiguity surrounds methods of manipulating data to produce useful information or methods of organising humans or communications between humans. Likewise, there is uncertainty as to what degree of connection there must be between any physical artifact involved and the novel and inventive step claimed. This is an aspect of the issue that Australia could resolve by imitating United States jurisprudence.

D Lessons to be Taken From United States Law

The most important lesson we can take from the United States is that the recognised categories of excluded matter are fundamental principles, natural phenomena and abstract ideas. It is argued that the categories of excluded matter in Australia are identical to those recognised in the United States.

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A critical reading of United States law also reveals that a physicality requirement is not good law in that jurisdiction. Newman J’s dissenting opinion in Bilski demonstrates for the benefit of Australian courts that there are substantial arguments against a physicality requirement in any form, a view that rejects the Federal Court’s approach in Grant. Newman J’s opinion may appeal to Australian courts or legislators because it is arguably consistent with Australian law. The opinion is consistent with the objects of patent law expressed in NRDC to provide incentives to invent in any field of technology. It recognises that technological developments are excitingly unpredictable and that new classes of invention presently unforeseen should not be excluded unnecessarily from patentability by a restrictive test. Applying this approach in Australian law would naturally leave the scope of the judicially recognised exceptions to be decided at a later date. Australia should follow the guidance provided by the United States that it is the remaining strictures of novelty, obviousness and the need to properly describe the invention that are the focus of patentability.

Australia should follow the guidance of the United States, that it is the remaining strictures of novelty, non-obviousness and the need to properly disclose the invention that are the focus of patentability. If a patentee cannot satisfy these strictures, he or she does not have an invention that patent law will recognise and is not deserving of the protections it affords.

If the Australian courts are to persist with a physicality requirement, they could at least be guided by the Federal Circuit’s machine-or-transformation test, which is at least a more sophisticated and considered approach to the issue. In Bilski and Comiskey, the Federal Circuit drew a distinction between physical transformation and physical steps, a distinction that appears not to have been considered by the Federal Court in Grant. This includes the clarification that a claim which recites physical steps, but neither recites a particular machine or apparatus, nor transforms an article into a different state or thing, is not patent eligible. Under United States law, mere physical steps, communication between humans, insignificant extra- or post-solution activity are not patent eligible.
The *Bilski* decision, however, is not a definitive guide. In many ways, it gives little indication as to whether the raw materials of the Information Age, such as the manipulation of electronic signals and data, can be patented. What is does reveal is a finding that the physical transformation permitted includes transformations representative of real physical objects or substances. This would permit an electronic signal representative of a physical object or substance, or a computer system that displays information representative of actual physical phenomena. What it leaves unresolved is whether a computer system that manipulates data in a useful way, as was the case in *CCOM v Jiejing*, is patentable subject matter.

Regardless of the approach taken on the physicality front, Australia must heed the warnings in *Parker v Flook* and *Diamond v Diehr*, that insignificant post-solution activity will not transform non-patent eligible subject matter into patent eligible subject matter, and incorporate this principle into Australian law. This is a critical tool useful in distinguishing principles of nature and abstract ideas from patentable inventions, which demands that the inventive step be housed in something capable of practical application, rather than a mere idea.

**E  The Next Step: Addressing the Normative Question**

These conclusions have been based on a reading and interpretation of the existing law as it currently stands. Very little consideration has been given to the issue of what the law should be. As such, this has not been a normative quest. There are good reasons for taking this approach. If there are good policy reasons that suggest the law should not be as it is stated here, then changes in light of those arguments can only rightfully be made by the legislature, not by courts. The question that remains is whether inventions that do not involve a machine or physical device, or cause a physical transformation of matter, should be patentable subject matter.
CHAPTER 5 - PHYSICALITY IN THE INFORMATION AGE

I INTRODUCTION

Previous chapters of this thesis have concluded that, as matter of law, the patentable subject matter inquiry does not contain a physicality requirement. They have also concluded that the history and incentive theory of patent law does not support the existence of a physicality requirement. In this chapter, the issue is addressed from a normative perspective: it asks whether the patentable subject matter test should contain a physicality requirement. The conclusion reached is that it should not, because a physicality requirement is not an appropriate means of encouraging much of the valuable innovation we are likely to witness during the Information Age. In addition, it is argued that concerns raised that there is a crisis in patent law caused by a trend of overreaching commoditisation or propertisation, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, inventiveness and sufficiency of description will exclude undeserving subject matter from patentability.

By the rules it imposes, the legal system plays a part in facilitating and promoting technological innovation, and economic thought.¹ Any attempt to fundamentally reconfigure the patentable subject matter rules, say by imposing a physicality requirement, will have normative implications. By determining which technologies may be the subject of a patent, the patentable subject matter inquiry defines the social values that the patent system serves.²

Having regard to normative issues and policy considerations is necessary in the proper administration of justice and the alignment of law and social values. Policy considerations are an important feature of the common law system because not all legal outcomes can be adequately justified merely by an application of black-letter

law. In many cases, it will be sufficient for judges to blindly apply precedent, safe in the knowledge that the laws they apply give results that are consistent with the reasonable expectations of the community and serve the interests of fairness and justice. However, while legal disputes are to be settled according to law rather than personal whim, judges cannot ignore the ramifications of their decisions and should be alert to the fact that the law must evolve as political, social and economic conditions change. One criticism made of the Federal Circuit’s decision in *Bilski* is that the majority sought to base its decision purely on a reading of existing Supreme Court precedent without having regard to the interests and policy that it intended to serve by removing non-physical advances from the scope of the patent system.

To remain relevant and continue to allow patent law to achieve its objectives, the law must keep pace with new trends in technology. It must be able to respond appropriately to the claims of innovators who seek to push what are currently understood to be the boundaries of patentable subject matter without unjustly enriching or depriving those innovators of the fruits of their labour. If it does not, it will hinder the public it is supposed to serve and people will find alternative means of achieving the practical outcomes they desire. Alternatively, if patent law fails to keep pace with modern commercial needs, new forms of intellectual property protection will displace it. These alternative means will likely be based in secrecy, rather than the openness that patent law’s disclosure and enablement regime promotes.

At this point in time, it is onward rushing technological evolution which requires that existing ideas about patent eligibility be challenged. There is a need to decide

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3 It is the responsibility of the judges who administer the common law to pay heed to the social policies it implements. As Oliver W Holmes, *The Common Law* (1881) 35-36, cited in *In re Ferguson*, 558 F.3d 1359, 1368 n 1 (Fed. Cir. 2009) (Newman J), stated: The very considerations which judges most rarely mention, and always with an apology, are the secret root from which the law draws all the justices of life. I mean, of course, considerations of what is expedient for the community concerned. Every important principle which is developed by litigation is in fact and at bottom the result of more or less definitely understood views of public policy; most generally, to be sure, under our practice and traditions, the unconscious result of instinctive preferences and inarticulate convictions, but nonetheless traceable to views of public policy in the last analysis.


6 Ibid.
whether the benefits of the patent system should extend to encourage and protect the sorts of knowledge and process-based innovation we are likely to see in the ‘knowledge economy’ of the Information Age. Addressing the patent eligibility of non-physical inventions involves asking what the proper scope and role of patentable subject matter is. This involves asking whether excluding non-physical inventions will have a detrimental effect on innovation and whether allowing patents on non-physical inventions is worth the inconvenience that the resulting monopoly rights will cause the public. It also involves asking what impact a physicality requirement will have on the different areas of technology that are likely to feature prominently on the technological landscape in the foreseeable future.

This chapter is organised in the following way. In Part II it is argued that physicality is not a desirable limitation on the scope of patentable subject matter because it will have a detrimental effect on the rate of innovation and technological progress in the Information Age. This part also addresses concerns that have been raised in regard to allowing patents over non-physical inventions that are not mechanical or industrial in nature. Part III examines the effect that introducing a physicality requirement would have on various fields of technology, particularly emerging technologies that are likely to have a profound social impact in the future. Conclusions are found in Part IV.

II PHYSICALITY AND THE INFORMATION AGE

A An Appropriate Subject Matter Test For the Information Age

On the basis of the preceding analysis, it is argued that there are a number of desirable traits that the patentable subject matter test should involve. It should remain a broad, flexible and forward-looking test. It should comfortably accommodate all new and useful inventions that fall within the useful arts and do not fall within the recognised categories of excluded matter. The test must be technology-neutral and industry-neutral. While the objects of patent law are to encourage the creation and disclosure of new innovation for the benefit of the public, the subject matter inquiry should not involve matters of ethics and social policy upon which the courts have no
special expertise. Finally, it should not involve arbitrary limitations that are engineered to achieve social goals.

B  A Physicality Requirement is Inapposite in the Information Age

Limiting the scope of patent eligible subject matter to inventions which involve a physical effect or transformation is not well suited to promoting innovation in a modern knowledge-based economy. New and non-obvious processes do not arise only in processes that involve a physical transformation of matter or reside in a machine. A physicality requirement is a backward-looking test that confines the scope of patentable subject matter to technologies of the past. It essentially confines all process patents to manufacturing methods, using a test that may have been appropriate during the Industrial Age, but is no longer appropriate in an information-based economy.

There is always resistance when the courts expand the bounds of patent eligible subject matter to include new realms of technology. In the early 1980s, software patents sparked a flurry of controversy that continues today in the same way that patents involving telephony did in the 1850s. Likewise, the rush to patent business methods following the State Street decision in 1998 was cause for consternation in the same way that biotechnology patents were in the 1950s. In each case, critics warned that new kinds of patents would harm scientific discovery and innovation.

Limiting patent eligibility to physical inventions is emotive because it reflects an understanding of the patent system which matches many of our sensibilities. It largely limits the scope of the patent system to encouraging innovation that is of traditional

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8 In re Bilski, 545 F.3d 943, 976 (Newman J), 1011 (Rader J) (Fed. Cir. 2008).

9 Moy, above n 5, 1086
industrial application, namely the creation of new physical machines, devices and physically-transformative methods. However, today’s advances in acquiring and using knowledge are producing a host of creative breakthroughs which ought to receive the same treatment as traditionally recognised advances in the mechanical, chemical and agricultural fields. In an era in which many indispensable technological advances are likely to be information processing advances with few, if any, physically transformative features, limiting the reach of the patent system to new industrial manufacturing processes will render patent protection an irrelevant tool of a bygone age.\textsuperscript{10} As we move to becoming an economy that acknowledges that innovation is little more than practically applied information, the more we need patent law to adapt to this changed technological reality.

The physicality requirement that has been imposed in Australia and the United States removes the incentives of patent law that might otherwise have encouraged the creation of potentially valuable technologies. The economic consequences of the decision to introduce this requirement are that there are new technologies that will either not be created or not disclosed to the public (either at all or as quickly as they would have been had patent protection been available).\textsuperscript{11} As a result, the constitutional direction to promote the progress of science and useful arts in the United States, and its Anglo-Australian common law equivalent, will be undermined.\textsuperscript{12} The test for determining whether an alleged invention is patent eligible must be technology neutral. It must not arbitrarily discriminate between different technologies and different classes of invention. Maintaining a patentable subject matter test free of artificial fetters, such as a physicality requirement, is necessary in achieving this. Many new and useful technological inventions that would otherwise

\textsuperscript{10} Gruner, ‘Intangible Inventions’, above n 7, 360-361 (noting that ‘information-processing innovation is at the heart of many of the most important changes now underway in our individual, social, business, and governmental activities.’); Moy, above n 5, 1086; Karjala, above n 7, 439.

\textsuperscript{11} Rochelle Cooper Dreyfuss, ‘Nonobviousness: A Comment on Three Learned Papers’ (2008) 12(1) Lewis & Clark Law Review 431, 438 (‘[i]n the fullness of time, it is highly likely that every invention will be made; to a large extent, the real goal of patent law is not to induce invention, but instead to induce it sooner rather than later.’).

\textsuperscript{12} While there is no Australian or British constitutional equivalent of the requirement that patents promote the progress of ‘useful arts’: Grain Pool of Western Australia v Commonwealth of Australia (2000) 202 CLR 479, 498; it is the case that the Anglo-Australian common law does contain such a requirement: National Research Development Corporation v Commissioner of Patents (1959) 102 CLR 252, 275 citing Re Virginia-Carolina Chemical Corporation’s Application (1958) RPC 35, 36.
be patent eligible, and deservingly so, would be left outside the scope of a physicality-oriented patentable subject matter test.

A national strategy of promoting innovation requires legal certainty, strong and predictable property rights, and broad subject matter eligibility. Where either the law or property rights are uncertain, incentives to innovate and invest in innovation are diminished or lost.\(^13\) Firms’ investment decisions are tempered by risk aversion. Uncertainty about the profitability of potential investments increases when it is unclear whether the products and processes developed through research and development are likely to be patentable and thus be the subject of property rights that will adhere to the firm. This uncertainty can promote risk-adverse behaviour. Conversely, certainty can promote investment.\(^14\) If firms cannot be certain that intellectual property rights will protect their inventive output, they will keep inventions secret for as long as they can. The result is that the public loses, or faces delay in gaining, access to new knowledge and products.\(^15\) The effect of uncertainty on investment is that the value and credibility of firms and their assets becomes unclear. Introducing a physicality requirement would necessitate a massive re-evaluation of the economic worth of intangible assets previously thought to be patent eligible. In the face of uncertain or weak intellectual property rights, firms cannot reliably convey information about their inventions. This leads to unnecessary expenditure in the form of transaction costs and litigation, the consequence of which is that firms are less profitable and therefore will employ fewer research staff and devote less time to research and development. Conversely, by allowing firms to easily recognise which inventions may warrant a patent, the law will encourage investment.

The decision to introduce a physicality requirement abruptly changed the law and unsettled the reasonable expectations of inventors, investors and patentees, who had relied on years of jurisprudence that broadly encouraged all forms of practically applied innovation without restriction.\(^16\) In the words of Newman J:

\(^15\) *In re Bilski*, 545 F.3d 943, 992 (Fed. Cir. 2008) (Newman J) (dissent) (‘Stable law on which industry can rely, is a foundation of commercial advance into new products and processes.’).
The wider effect will be a disincentive to innovation-based commerce. For inventors, investors, competitors, and the public, the most grievous consequence is the effect on inventions not made or not developed because of uncertainty as to patent protection.¹⁷

There is no logical basis for labelling non-physical technologies as non-inventions. Inventions are patentable, provided that they are new, in the sense of not being a mere discovery, novel, in the sense of not having been previously publicly disclosed, and inventive, in the sense of not being obvious to person skilled in the relevant art. An invention is something that is repeatable in the sense that it produces consistent, predictable and near identical results each time it is carried out, such that it extends beyond the first embodiment.¹⁸ Where a product, such as a new machine or device, is concerned, it must be possible to create an identical machine or device by following the inventor’s instructions. Where a process is concerned, it must be possible to achieve consistent, predictable and near-identical results to those claimed by the inventor each time the process is instantiated.

Since its inception and throughout its history, the object of the patent system has been to provide sufficient encouragement to inventors to create and disclose the broadest possible range of new technological advances for the benefit of the public. Physical embodiment or transformation is not relevant to invention. The concept of invention is, like patentable subject matter, grounded in the practical application of a new idea or principle to achieve a useful result. The result to be obtained must produce some advantageous outcome of economic significance and practical reality. Whether it is embodied in a machine, physical device or causes a transformation of matter is surely not significant. The exclusion of advances that do not involve a physical effect or transformation is inconsistent with the objects of the patent system to promote innovation in whatever form it arises. It is inconsistent with the courts’ pronouncements in favour of a broad and flexible subject matter inquiry, detrimental to the advancement of technology and is supportive of free-riders at the expense of innovators and entrepreneurs. It reveals a short sighted mindset trapped in existing

¹⁷ Ibid.
paradigms and assumptions, all of which are the very opposite of what is required to stimulate innovation in the knowledge economy. It also displays a narrow understanding of what ‘technology’ is. It denies that technology is more than the creation of new devices and physical methods.

Arguments in favour of a broad or unlimited scope of patent protection would have it that the recognised categories of excluded matter are the only limits upon the scope of patentable subject matter. The arguments in favour of narrow patent protection are premised upon the assertions that not all innovation is suitable for, or deserving of, patent protection, and that regardless of novelty, inventiveness or utility, there are some ideas and aspects of human behaviour that ought not be removed from the intellectual commons.  

John Thomas is of the view that extending patent protection into every corner of human activity will not result in net social gain. He holds that ‘patent law seems poised to embrace the broadest reaches of human experience’, and as a consequence, is a threat to personal liberties. He claims that there is a set of human activities such as ‘swinging a golf club, treating cancer or administering a mortgage’ that ought to lie outside the bounds of patent eligible subject matter. The solution he proposes is that patent eligibility should be limited to inventions that are of industrial application, where industrial application means that inventions must involve physical machines or

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19 The objective of this discussion is to analyse the arguments as to what is the proper scope of patentable subject matter at the time patent validity is determined. As this discussion is limited to issues of patent validity (which is coextensive with the scope of patent protection), it does not consider issues of patent scope in the case of patent infringement. That is, it does not consider whether patent claims should be interpreted literally or augmented by non-literal infringement, say by a doctrine of equivalents. For the distinction between determining patent scope in terms of patent validity (or protection), as opposed to the case of patent infringement, see A Samuel Oddi, ‘Un-Unified Economic Theories of Patents -- The Not-Quite-Holy Grail’ (1996) 71 Notre Dame Law Review 267, 271-273.


22 Ibid.
devices or the transformation of physical matter. In his view, limiting patent eligibility in this way would at the very least, remove matters of aesthetics, personal skill and human organisation from the patent system.  

Similarly, Justin Hughes has set out what he describes, based on Locke’s ‘enough and as good’ provision, as two broad categories of ‘central ideas’ that are never permitted to become private property and are to be held in a permanent commons. The first is the category of common ‘everyday’ ideas, ‘such as thinking to wash one’s car, to add paprika to a quiche for coloring, or to tell mystery stories to your cub scout troop.’ The second is the category of ‘extraordinary ideas’, being ideas that disclose facts about the world and ideas that are subject to widespread use, and include ‘the Pythagorean theorem, the heliocentric theory of the solar system, or the cylindrical column in architecture.’ Hughes’ argument is that these ‘central ideas’ are not patentable because giving property rights over them would involve a massive reallocation of wealth into the hands of those who hold property in these ideas and that not enough would be left in the commons for everyone else. He is of the view that the importance of these ideas and the ubiquity of their use is enough to render them beyond the realm of private control because otherwise society would be harmed.

While it is true that these universal ideas are not suitable for the award of a patent monopoly, the ubiquity of their use is not enough to render them beyond the realm of patent eligible subject matter. As such, they cannot be used to support a narrowing of the scope of patent eligibility above and beyond the recognised categories of excluded matter. While they ought not be privatised, the reason for this is that they would not satisfy the other strictures of patentability. It is the existing statutory requirements of novelty and inventiveness that prevent patents from removing anything from society’s existing store of knowledge, not special categories of excluded matter. The ‘everyday ideas’ Hughes has described either lack novelty, are obvious, or have not been reduced to a specific practical application (and therefore are ‘abstract ideas’).


24 Hughes, above n 20, 320.
The reason the ‘extraordinary ideas’ that disclose facts about the world Hughes refers to are not patentable is an issue of patent eligible subject matter. These are ideas that are discoveries or would involve a patent over a principle of nature and are therefore already excluded. The ‘extraordinary ideas’ that are subject to widespread use would be lacking in novelty. These are not issues of patentable subject matter. If any of these ideas slip through these protections and are propertised by being made the subject of a patent, that is a failing of the administrators of the system in applying the law correctly, not the law itself.

The work of Erik Maurer quintessentially represents the argument in favour of broad patent protection at the time patent validity is determined. For Maurer, all innovation, no matter how beneficial to society, so long as it is novel, nonobvious and of utility, should be patentable regardless of its subject matter, provided that what is claimed is an invention and not one of the categories of excluded matter. For Maurer, it is free-riding, not the threat of a tragedy of the anticommons that poses the greater threat to sustaining innovation. Maurer uses as examples patents on sports moves, business methods and legal strategies, and patents on medical and surgical procedures, all of which he regards as patentable subject matter. He contends that the law in the United States is consistent with this broad view, as ‘existing statutory provisions and judicial precedent embrace the most economically efficient, though admittedly broad, perspective.’

Maurer is of the view that patentable subject matter should include anything under the sun made by man because free markets will determine what subject matter should be patented. He considers that artificial and subjective limits on patentable subject matter would weaken the efficient, market-driven system contemplated by existing patent laws. Maurer’s argument is that a separate patentable subject matter test in addition to the criteria of novelty, inventiveness and utility is unnecessary and an

26 Ibid 1059-1063.
27 Ibid 1075-1084
28 Ibid 1058.
undesirable fetter on innovation.\textsuperscript{29} He emphasises that patents will only issue to inventors that contribute something previously unknown to society’s store of knowledge and would not have been obvious in light of previous knowledge,\textsuperscript{30} even if only a small contribution, because ‘even small increases in knowledge make positive contributions to economic growth.’\textsuperscript{31}

C A Physicality Requirement is an Inadequate Proxy Test

A physicality requirement is a proxy test designed to avoid the need to conduct a thorough patentable subject matter inquiry. Reliance upon a physicality requirement is seen as a predicable, workable and less-intellectually demanding approach to identifying patent eligible subject matter.\textsuperscript{32} It is a means of avoiding difficult questions such as what the terms ‘abstract’ and ‘practical application’ mean and how the ‘useful arts’ are to be separated from the ‘fine arts’ of literature, history, and painting. It also dispenses with the difficult issue of processes that exist solely within the human mind, because a purely mental process would involve no physicality transformation of matter.\textsuperscript{33}

Contrary to the first impressions many might have formed, dispensing with a physicality requirement is in fact the convenient, predicable, workable and less-intellectually demanding approach to distinguishing between eligible and non-eligible subject matter. Although the subject matter inquiry may appear daunting, a physicality requirement creates its own difficulties. As Rader J noted in dissent in \textit{Bilski}, the Federal Circuit’s machine-or-transformation test propagates unanswerable questions surrounding the extent and degree of physicality needed.\textsuperscript{34} Dispensing with the physicality requirement avoids those difficult and arbitrary questions. It removes from the patent eligibility analysis difficult questions such as: What form or amount of ‘transformation’ is needed? When is a transformation of data that is

\textsuperscript{29} Ibid 1058-1059.
\textsuperscript{30} Ibid 1064.
\textsuperscript{31} Ibid 1073-1074.
\textsuperscript{33} Ibid.
\textsuperscript{34} In re Bilski, 545 F.3d 943, 1015 (Fed. Cir. 2008) (Rader J) (dissent).
'representative' of a physical object sufficiently linked to that object to satisfy the transformation test? What, in theory and in practice, is the material difference between data ‘representative’ of a physical object and data which are not? What link to a machine is sufficient to invoke patent eligibility? Is a general purpose computer running a software program a ‘specific machine’? If under United States law, § 101 recognises ‘machines’ as a category of patentable subject matter, why does the ‘process’ category require a machine prong, and if it does, what connection with a machine is necessary? Does the machine prong of the machine-or-transformation test require that a process be a machine or that it merely involve or rely on the use of a machine?

Dispensing with a physicality requirement proxy test removes anomalous inconsistencies between the objects of patent law and what is actually patent eligible. It forces us to consider the scope of patentable subject matter and explore its boundaries. It forces us to consider how the recognised categories of excluded matter are to be applied and what the differences between the useful and the fine arts are. All these are necessary issues that must be addressed on a case-by-case basis and cannot be avoided by relying on a proxy test without distorting the purpose and intent of the fundamental principles upon which patent law rests.

The Federal Circuit in *Bilski* demonstrated the error of employing a proxy test when it rejected the *State Street* ‘useful, concrete and tangible result’ test after finding it to be ‘insufficient to determine whether a claim is patent eligible under § 101’. In doing so, the court observed that a proxy test can never be an adequate representation of the law. Despite this observation, it created a proxy test of its own when it introduced the machine-or-transformation test as the ‘sole’ test for determining patent eligibility. Rather than compounding this error, the courts must rely on the existing recognised categories of excluded matter to remove undeserving subject matter from the monopoly protection of the patent system. Sage advice in this regard was given in *In re Alappat*.

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35 Ibid.
36 Ibid 959.
37 Ibid.
38 33 F.3d 1526 (Fed. Cir. 1994).
Patent cases involving the distinction between idea or principle may involve subtle distinctions. …it is impossible to generalize with bright line rules the dividing line between what is in substance the invention or discovery of a useful application within § 101 versus merely the discovery of an abstract idea or law of nature or principle outside § 101. Each case presenting a question under § 101 must be decided individually based upon the particular subject matter at issue.\textsuperscript{39}

Devising a suitable test to determine patent eligibility often involves a trade-off between bright line rules and predictability and the flexibility and fairness of outcome that often accompanies a dull line test. Given the difficulties already encountered in the current debate, as a matter policy, it should be clear that a dull line test is the only fair and just outcome possible.

D Comparing Physicality in Patent Law and Material Form in Copyright

According to Moy, the distinction between technological and non-technological subject matter is the boundary that delineates patent and copyright.\textsuperscript{40} Patent and copyright have mutually coexisted for hundreds of years, largely operating within distinct and separate spheres of influence.\textsuperscript{41} Both patent and copyright law distinguish between principles and instantiations of principles, and neither the copyright system nor the patent system provides exclusive rights in abstract ideas themselves. Ideas, although neither copyrightable nor patentable in their own right, provide a foundation from which spring copyrightable works and patentable inventions. The law recognises that an instantiation can be privatised, but that the principle or abstraction itself must remain in the public domain. Copyright law requires that literary, dramatic, musical or artistic works must be somehow recorded in material form to be eligible for copyright protection. Material form means that there must be some tangible embodiment of the creation and the requirement for material form attaches to the ‘making’ of a work.\textsuperscript{42} A literary, dramatic, musical or artistic work is made when

\textsuperscript{39} Ibid 1554 (Archer, Mayer and Schall JJ).
\textsuperscript{40} Moy, above n 5, 1084.
\textsuperscript{41} Most authors trace modern copyright back to the British Statute of Anne in 1710: Statute of Anne, 1710, 9 Ann., c. 19 (Eng.).
\textsuperscript{42} For the Australian position see: Copyright Act 1968 (Cth) s 10.
it is first reduced ‘to writing or some other material form.\textsuperscript{43} This is the idea/expression dichotomy: the principle that copyright does not protect ideas or information, but will protect an idea that is expressed in material form from which accurate copies or reproductions can be made. Accordingly, what copyright protects is not the idea behind a particular work, but the particular form of language by which the information is conveyed.\textsuperscript{44}

Likewise, patent law does not protect abstract ideas, but protects a useful practical application of an idea. However, unlike copyright law, patent law does not require that an idea be reduced to some tangible physical form before it will be regarded as being a practical application of that idea. This is a consequence of what patent law protects: inventions. The study of information economics tells us that inventions are little more than useful knowledge and ideas that have been reduced to a specific practical application. It is the requirement that an invention must disclose a useful and practical result that marks the critical distinction between copyright and patent, not physicality. While it is essential that any invention claimed be capable of producing a useful result, a patent is not granted for a result \textit{per se}, but for a product or a process that produces a useful result.\textsuperscript{45} Thus, patent law’s focus is function, and includes works that have a function beyond informing, entertaining, or communicating knowledge to human beings, including methodologies for gathering, organising, and presenting information, or regulating human behaviour, accurately and efficiently.\textsuperscript{46}

Thus, we should look to the other requirements of patentability for limiting factors, such as novelty, inventiveness and utility to exclude undeserving subject matter, not physicality.

\textsuperscript{43} Copyright Act 1968 (Cth) s 22(1).
\textsuperscript{44} Donoghue \textit{v} Allied Newspapers [1938] Ch 106; \textit{Feist Publications, Inc \textit{v} Rural Telephone Service Co, Inc}, 499 US 340, 348 (1991). See also Art 9.2 of the \textit{TRIPS Agreement} and Art 2 of the \textit{World Intellectual Property Organization Copyright Treaty 1996} (‘WCT’), both of which state that ‘[c]opyright protection extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such’.
\textsuperscript{45} \textit{Corning v Burden}, 56 US 252, 268 (1854) (‘It is for the discovery or invention of some practicable method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself. It is when the term process is used to represent the means or method of producing a result that it is patentable...’); \textit{Mitchell v Tilghman}, 86 US 287, 391 (1873); \textit{Re Virginia-Carolina Chemical Corporation's Application} (1958) RPC 35, 36.
\textsuperscript{46} Karjala, above n 7.
Introducing a physicality requirement risks making patent law a tool of limited utility in the Information Age. As Moy notes, if patent protection is denied to emerging technologies on subject matter grounds, courts are likely to compensate by filling the apparent gap in coverage with copyright protection, which is of much longer duration. Copyright protection, for most subject matter, lasts for the life of the author plus 70 years, which is much longer than the 20 year life of a patent and wholly excessive as far as the need for an inventor to recoup expenses and make a reasonable profit are concerned.47

E Tragedy of the Anticommons: Too Many Different Owners of Too Many Fragmented Property Rights in Pioneering Technologies

A consequence of promoting a broad scope of patentable subject matter is an exacerbation of the ‘tragedy of the anticommons.’ Building new knowledge is a cumulative exercise. New knowledge is always built on existing knowledge. As such, property rights awarded to encourage innovation can actually obstruct it. According to Heller and Eisenberg, tragedy of the anticommons occurs when numerous actors have ownership rights and the power of exclusion over a scarce resource. The consequence of those competing rights is that the resource is underused because no one has an effective right to use all of the technology needed to advance a particular line of inquiry within the field.48 In this sense, it must be remembered that patent law recognises no analogue to fair use in copyright.49

Impediments to those who would otherwise innovate typically arise where private rights are allocated over pioneering discoveries in a newly emerging field of technology. When a new technology emerges, property rights in early breakthroughs may be allocated before the significance (or ordinariness) of those breakthroughs is properly understood. Once the foundation ‘building blocks’ of new technologies are

privatised, rights holders can impede new advances in the field. The effect is that those who would produce follow-on, or second-generation products and processes, need to license, what may in time be regarded as elementary principles, before they are free to operate. However, proponents in favour of a broad and expansive view of patentable subject matter say that the anticommons threat will not impede public dissemination of intellectual products, because licensing will ensure that innovation will be made available to those who need and are able to pay for it.

Anticommons arguments have an undeniable emotional appeal. They invoke ethical concerns and concerns about the ability of private citizens to freely access that which ought to remain in the public domain. However, they do not detract from the patent law bargain. They highlight some of the difficulties inherent in the existence of a patent system, but do not warrant an overhaul of the system (not that this is what Heller and Eisenberg have called for). The patent system needs to strike a delicate balance when allocating reward-based incentives between pioneering and follow-on inventors. How this balance is to be achieved will not be resolved by reducing the scope of patentable subject matter. Instead, it is rigorous application of the remaining patentability requirements that will balance these private and public interests.

Recognising non-physical inventions does not pose a threat to the public domain. The public domain will still contain inventions that have already been disclosed to the public. Existing personal liberties and everyday ideas will not be affected as they will be protected by the other requirements of patentability. These statutory requirements better serve the function of screening out unpatentable inventions than some vague physicality test.

50 Heller and Eisenberg, ‘Can Patents Deter Innovation?’, above n 48, 698, 699-700. An example of the tragedy of the anticommons in operation given by Heller and Eisenberg. They describe patents as being ‘tollbooths’ along the path of biomedical research relating to the human genome. They suggest that the research project into human genetics will be retarded by the existence of too many patent rights being held by too many different entities. They contend that if patent protections extend to mere fragments of DNA sequences, valuable research involving whole DNA sequences will be impeded by licensing and other transaction costs.

51 Wendy J Gordon, ‘An Inquiry into the Merits of Copyright: The Challenges of Consistency, Consent, and Encouragement Theory’ (1989) 41 Stanford Law Review 1343, 1439-1449. Only in circumstances where transaction costs would prevent such voluntary exchanges should intellectual property owners be denied absolute control over the uses of their works, either through an outright privilege (such as the fair-use doctrine) or through a compulsory licensing system.

52 Heller and Eisenberg, ‘Can Patents Deter Innovation?’, above n 48, 698, 699-700.

53 In re Bilski, 545 F.3d 943, 1015 (Fed. Cir. 2008) (Rader J) (dissent).
Arguments that patents over non-physical inventions will create additional impediments to doing business and create additional barriers to entry into markets are spurious, because these arguments apply to all patents. Patents of any type create extra due diligence requirements for businesses. For patents over any form of new technology, there will always be a need to license patented prior art. This is a necessary by-product of the system in which it is recognised that innovation is a cumulative activity.

**F Why Isn’t There a History of Patents for Non-Physical Inventions?**

Why there is no body of case law dealing with purely non-physical inventions or a demonstrable history of patents being granted in respect of them is a matter of conjecture. We have no solid evidence denying the patent eligibility of non-physical inventions in Anglo-Australian law before or after the passing of the Statute of Monopolies in 1623. Likewise, there is no solid evidence from the United States to indicate that they are not patentable. Cataloguing the types of processes that were typically patented in the eighteenth and nineteenth centuries is of little assistance in determining the scope of the ‘useful arts’ today. Doing so shows only a pattern in which patents were granted for manufacturing processes. It does not prove that the ‘useful arts’ were limited to only manufacturing processes. Given that the purpose of granting monopolies in England was to establish a manufacturing industry in a formerly agrarian country, this is unsurprising.

It is clearly not the case that the invention of new and useful non-physical methods is a recent phenomenon. New and inventive financial transactions, tax minimisation strategies, asset protection schemes, methods of organising a workforce, methods of teaching or training people and animals, compliance procedures and risk hedging strategies have been used for centuries. So, why is it that their patent eligibility has only recently come to the fore?

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It would appear that people either largely presumed that non-physical inventions are not patent eligible, or had not thought to patent innovation of this kind. Such an outcome would be unsurprising given that these are things that fall outside the traditional expectations as to what subject matter is designed to protect. It may be that our understanding of technology, or our understanding of the purpose and scope of the patent system, has prevented people from seeking patents over non-physical inventions. It cannot merely be assumed that since there has not been a consistent practice of patents for non-physical inventions being sought or granted, that these things are not patentable. In the words of Stern:

It is implausible that the 18th century represented an intellectual desert for innovativeness in business methods. It is more plausible to infer that the lack of colonial business-method patents reflects a belief in their patent-ineligibility.  

G Addressing Information Deficit, Lack of Prior Art and Patent Examination Failures

Patent examination failures usually arise when inventors seek to patent new technologies that which have not been patented before. The problems that emerge are not problems of subject matter, but are caused by a lack of suitable and comprehensive prior art repositories and an examination process that prevents patent examiners locating essential prior art. When new technologies emerge or new areas are discovered to be patentable, it takes some time for prior art repositories to mature to a state where they contain sufficient information to be of use in determining


whether an alleged invention is novel and not obvious. This problem was no doubt encountered when the first computer software patent applications were examined.

This is compounded by the fact that patent offices around the world are overburdened by the volume of new patent applications they receive each year. The USPTO receives more than 420,000 patent applications each year and has a backlog of more than 1 million applications. The pressure that this backlog places on the USPTO results in less rigorous reviews of patent applications being undertaken and less robust patents being issued.\(^{57}\) The Japan Patent Office (‘JPO’) reports similar numbers. It receives over 400,000 patent applications annually and has a backlog of more than 750,000 applications.\(^{58}\) In contrast, only approximately 25,000 standard patent applications were filed in Australia between 2004 and 2007.\(^ {59}\)

The role of a patent examiner is an unenviable one. Patent law is a complex and difficult area of the law to understand and apply that is complicated by the voluminous nature of the material, court decisions that confuse the law and introduce uncertainty, and different opinions that are aired as to what the law is and what it should be. Secondly, a large body of knowledge is needed to understand the prior art and what the common general knowledge of experts in the field is. This information is often difficult to locate and is arguably not knowable. Further, the state of the art is rapidly changing. With such a vast array and volume of new patent applications being filed, it is simply not possible for each and every patent examiner to be an expert in every piece of technology that comes across his or her desk. Similarly, patent examiners cannot feasibly locate every piece of prior art that is relevant to the issue of whether the application in question is novel and non-obvious. Beth Noveck has lamented the lot of the examiner.

Examiners have reason to be unhappy. They have the increasingly difficult job of making legally enforceable decisions in the public interest without the benefit of enough time or adequate informational resources. With the

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exponential growth in the number and complexity of applications facing the patent examining corps, the challenges of finding and evaluating relevant information have only increased.\(^\text{60}\)

Adam Jaffe and Josh Lerner have comparable concerns.

The patent office has been granting patents on old ideas because it has inadequate examination resources, and also because it is not very good at finding information about the relevant existing technologies, particularly in new, fast-moving technological fields.\(^\text{61}\)

These issues have been of particular concern since the flood of software and e-commerce method patent filings began in the mid-1990s.

There is no doubt that patent offices in Australia, the United States and elsewhere were not equipped to deal with the volume and novelty of applications for software and e-commerce method patents which were filed in increasing numbers from the mid-1990s onwards. Patent offices – or at least the technology groups responsible for examining patents in these fields – have been understaffed and lacking in expertise to properly examine these applications for novelty and inventiveness, with the result that patents have undoubtedly been granted for inventions that were not new or which were obvious.\(^\text{62}\)

One of the largest causes for concern is the inexperience of patent examiners in the software, business method and e-commerce fields. Until the 1990s, most patent examiners had experience in the physical sciences and engineering, but not computer science, financial systems and business.\(^\text{63}\)

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\(^{60}\) Noveck, *Wiki Government*, above n 56, 48-49.


\(^{63}\) Ibid 371.
While there are problems with the patent examination process, cutting down subject matter at the threshold is the wrong approach to take, because doing so will have unintended consequences. Those consequences are a removal of the incentive to create many novel and inventive products and processes that will improve the living standards of human beings. A better approach is to ensure that the other requirements of patentability are properly examined and satisfied.

While prior art repositories of non-physical inventions may lack the depth and comprehensiveness found where more established subject matter is concerned, it is only a matter of time before this deficiency will be remedied. According to Gruner, the difficulties encountered in locating prior art for business method and computer software patents may be no more serious than those for other technologies before they were recognised as falling within the scope of patentable subject matter by judicial decisions.64 Indeed, improvements may already be occurring in this regard. There is evidence that the USPTO’s grant rate in business method classes has fallen dramatically. As examiners have gained more experience with such patents and with searching public databases for information about them, they have rejected more patents.65

However, to properly contend with the challenges that lie ahead in what can only become an increasingly complex system, technological, administrative and legislative changes are needed. What the patent system needs is innovation in searching and managing prior art repositories. Advances in information management technologies can be employed by patent offices to create better, more intelligent, artificial searching tools to assist the search for prior art. Advances in the field of artificial intelligence, data searching and legal expert systems will reach a stage where they can be reliably used by a patent examiner to determine whether an invention is actually novel and non-obvious and state what the common general knowledge in the relevant field is.

64 Gruner, ‘Intangible Inventions’, above n 7, 368.
65 Mark A Lemley and Bhaven Sampat, ‘Is the Patent Office a Rubber Stamp?’ (2008) 58 Emory Law Journal 181 (finding that only 15% of applications in Class 705, business methods, had been approved 7 and a half years after filing).
The administrative reforms required are those that involve better coordination and cooperation between national patent offices to share the load as far as conducting prior art searches is concerned. Further, there needs to be more accessible means of encouraging third parties with specific expertise in relevant areas to provide the patent office with information relevant to the novelty and inventiveness of applications under examination. The Peer-to-Patent projects facilitate this by placing pending patent applications online on a publicly available website and encouraging appropriately skilled and qualified people to review those applications and submit relevant prior art. The ten most relevant prior art documents, as selected by the community of reviewers, are forwarded to the patent office to be considered by the patent examiner responsible for assessing the application in question.

Peer-to-Patent is a step in the right direction and is the genesis of what will hopefully be a more comprehensive means of promoting citizen engagement with government administrative processes. What is needed is a global Peer-to-Patent platform and a means of developing a culture, in which the large companies that are the major users of the patent system donate a portion of their technically-skilled employees’ time to peer reviewing pending applications as way of supporting the system which provides them with the exclusive property rights they value so dearly. While Peer-to-Patent is not a comprehensive solution to patent law’s difficulties, it has the potential, in concert with other initiatives, to make incremental improvements to the system.

There is also a need to develop prior art repositories that can be searched by patent examiners and others to identify what the state of the art in a particular field of technology is. Projects that go some way to making it easier to search the prior art

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67 In the United States, third party protest is only allowed with the consent of the patent applicant under 35 USC 122(c) (protest and pre-issuance opposition), which provides that: ‘The Director shall establish appropriate procedures to ensure that no protest or other form of pre-issuance opposition to the grant of a patent on an application may be initiated after publication of the application without the express written consent of the applicant’. In contrast, this restriction does not exist under Australian law, which under Patents Act 1990 (Cth) s 27 (entitled, ‘Notice of matters affecting validity of standard patents’) provides that: ‘A person may, within the prescribed period after a complete specification filed in relation to an application for a standard patent becomes open to public inspection, notify the Commissioner... that the person asserts, for reasons stated in the notice, that the invention concerned is not a patentable invention...’.

68 See generally Noveck, Wiki Government, above n 56.
and understand the state of the art by encouraging scientists to publish new breakthroughs in biotechnology in the public domain as quickly as possible include:69 CAMBIA’s Patent Lens,70 the Bermuda Principles,71 and the HapMap project.72 The Open Source as Prior Art (‘OSAPA’) initiative is a prior art repository for software.73 The goal of OSAPA is to reduce the number of poor quality patents that issue by improving the accessibility of code and documentation that can be used as prior art during the patent examination process. The project encourages programmers to electronically publish source code and its related documentation as a source of prior art as early as they can. It also involves an interface that allows patent examiners and others to more easily locate relevant electronically published source code and related documentation. Further more, it facilitates a taxonomy or tagging system that can be used by software developers, patent examiners and others to describe and help locate relevant source code and documentation. For the open source community and others, this will hopefully reduce the number of undeserving software patents that can be used to threaten software developers.

The lesson in this regard is that those concerned with the future of the innovation system, both in the public and private sectors, should focus on establishing prior art

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71 The Bermuda Principles (also known as the Bermuda Accords) are a set of agreements developed in 1996 at an International Strategy Meeting on Human Genome Sequencing, and endorsed in Bermuda the following year. The Bermuda Principles were intended to provide a basis for a free sharing of pre-published data on gene sequences among scientists through the rapid public disclosure of genomic data to create prior art which would defeat potential patents filed by high-profile private sector competitors: Andrés Guadamuz González, ‘Open Science: Open Source Licenses In Scientific Research’ (2006) 7(2) North Carolina Journal of Law & Technology 321, 358 citing Rebecca Eisenberg, The Public Domain in Genomics (2000), <http://www.law.nyu.edu/ili/conferences/freeinfo2000/abstracts/eisengberg.html>.

72 The International Haplotype Project (HapMap) was a three-year project which ran from 2002 to 2005. The aim of the project was to develop a haplotype map of the human genome, mapping common patterns of DNA sequence variation by determining the genotypes of one million or more sequence variants, their frequencies and the degree of association between them, in DNA samples from populations with ancestry from parts of Africa, Asia and Europe. The HapMap will allow the discovery of sequence variants that affect common disease, will facilitate development of diagnostic tools and will enhance our ability to choose targets for therapeutic intervention. The HapMap principle is that scientific data should be freely available to the public and that restrictive patents should not be filed on inventions based on submitted data. HapMap <http://www.hapmap.org/abouthapmap.html> at 22 May 2007.

repositories that enable people to conveniently upload information describing new inventions and discoveries as quickly as possible, so that the teething problems that ordinarily arise when patent applications claiming advances in new areas of technology are filed can be minimised. They should also focus on developing projects such as Peer-to-Patent and making them part of standard patent office practice.

Other initiatives, which are a step in the right direction in this regard, include work sharing arrangements that have been instituted by various national patent offices to improve the communication of search and examination results during patent prosecution. These include various bilateral or multilateral arrangements between patent offices such as the Patent Prosecution Highway (‘PPH’) and the Vancouver Agreement.

The Patent Prosecution Highway (PPH) is a set of initiatives for providing accelerated patent prosecution procedures by sharing information between some patent offices. The PPH is a result of bilateral arrangements made between national patent offices. It permits each participating patent office to benefit from work previously done by another patent office, with the dual goals of reducing examination workload and improving patent quality.

A trilateral Patent Cooperation Treaty/Patent Prosecution Highway (PCT/PPH) pilot program commenced on 29 January 2010 for a planned period of two years. This pilot program enables fast-tracking of patent examination procedures for PCT applications that have received a positive written opinion of either the International Searching Authority or the International Preliminary Examining Authority, or an international preliminary examination report from the European Patent Office (EPO), the Japan Patent Office (JPO) or the United States Patent and Trademark Office (USPTO).

A similar arrangement exists between signatories to the Vancouver Agreement, which is a collaborative arrangement between the Canadian, Australian and United Kingdom patent offices. These three offices, known as the Vancouver Group, aim to eliminate duplication of effort between the offices by sharing information and relying on examinations performed by other offices within the group.
In summary, patent examination failures can be addressed through technological and administrative reforms. Patent examination can be improved through deploying new technology to assist examiners to effectively locate and search through the myriad of prior art. It can be improved through administrative reforms such as better coordination and cooperation between national patent offices to share the load as far as conducting prior art searches is concerned, promoting and developing projects such as Peer-to-Patent and projects that publicise new technologies as quickly as possible.

III THE IMPACT OF A PHYSICALITY REQUIREMENT ON VARIOUS AREAS OF TECHNOLOGY

This section considers the effect that imposing a physicality requirement will have on innovation in a number of areas of technology. It finds that a physicality requirement would cause unsatisfactory consequences in a number of industries and across a range of existing and emerging technologies.

A Computer Software

The patenting of computer software remains a controversial proposition even though the courts have clearly ruled in favour of the patentability of software.\textsuperscript{74} Despite the controversy, computer software inventions are possibly the best illustrative example of why a physicality requirement is an inappropriate fetter on the scope of patentable subject matter.

It is recognised that computer software is amenable to both copyright\textsuperscript{75} and patent protection.\textsuperscript{76} Each form of this dual protection provides distinct advantages to the

\textsuperscript{74} See for example \textit{Diamond v Diehr}, 450 US 175, 187 (1981); cf 219-220 (Stevens J, with whom Brennan, Marshall and Blackmun JJ joined) (dissenting) (Stevens J would have declared all computer software programs that are ‘entirely dependent upon the utilization of a computer in a familiar process’ unpatentable).

\textsuperscript{75} In Australia, a ‘computer program’ is protected by copyright law by virtue of it being a ‘literary work’, and its object code and source code being a ‘computer program’, under the \textit{Copyright Act 1968} (Cth) ss 10(1), 21(5), 31.

\textsuperscript{76} A patent may be awarded in respect of a computer software program when the requirements for patentability in the \textit{Patents Act 1990} (Cth) have been satisfied. See generally \textit{Burroughs Corporation}
holder. While computer software is certainly protected by copyright, copyright law will only protect the expression of an idea in material form, not the underlying inventive idea itself.\textsuperscript{77} The difference between protecting computer software with copyright and patent law is that copyright law protects against literal copying or adaptation of source code, while patent law is capable of protecting a program’s functionality.\textsuperscript{78} Without patent protection, it is possible to independently produce a non-infringing version of software that reproduces a program’s functionality.\textsuperscript{79}

It is antithetical to established wisdom to argue that new computer software innovations lie outside the bounds of subject matter traditionally recognised as patent eligible. Computer software is the digital equivalent of the machines and articles of manufacture of the Industrial Age. Rather than producing manufactured articles of commerce, software is used to construct and transform the digital equivalent, namely, data and information. Alan Durham has explained the importance of the computer to today’s technological progress.

\textit{(Perkins’) Application} [1974] RPC 147, 158 (Graham J); \textit{International Business Machines Corporation’s Application} [1980] FSR 564, 572 (Whitford J); \textit{Re Beauregard}, 53 F.3d 1583 (Fed Cir, 1995) (Beauregard claims recite a computer-readable storage medium (such as a hard drive, CD, or DVD) containing a set of instructions that causes a computer to perform a process. Beauregard claims are considered to be patent eligible in the United States); \textit{Re Alappat}, 33 F 3d 1526 (Fed Cir, 1994); \textit{International Business Machines Corporation v Commissioner of Patents} (1991) 33 FCR 218; \textit{CCOM Pty Ltd v Jiejing Pty Ltd} (1994) 51 FCR 260.

\textit{Hollinrake v Truswell} [1894] 3 Ch 420, 427 (‘Copyright... does not extend to ideas, or schemes, or systems, or methods; it is confined to the expression; and if their expression is not copied the copyright is not infringed.’). In Australia: see \textit{Copyright Act 1968} (Cth) s 31(1) (copyright protection guards against the reproduction of a work in material form, but it does not prevent independent creation, which is the basis of the idea–expression dichotomy); \textit{Powerflex Services Pty Ltd v Data Access Corporation [No 2]} (1997) 75 FCR 108, 126 (Black CJ, Hill and Sundberg JJ). In the United States: see \textit{Baker v Selden}, 101 US 99, 244 (1879); \textit{Copyright Act 1976} (US) s 102(b) (17 USC § 102(b) provides: ‘In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.’); \textit{Feist Publications, Inc v Rural Telephone Service Co, Inc}, 499 US 340, 349-350 (1991); \textit{Eldred v Ashcroft}, 537 US 186, 219 (2003) (the idea/expression dichotomy limits copyright’s monopoly to an author’s expression, leaving ideas ‘instantly available for public exploitation.’); \textit{Lotus Development Corporation v Boland International Inc.}, 49 F.3d 807 (1st Cir. 1995) (holding that copyright does not protect the functional aspects of software, and as such that the menu command hierarchy of a computer spreadsheet program was not protected by copyright.). Also, the First Amendment precludes the extension of statutory monopolies to abstract ideas: \textit{Eldred v Ashcroft}, 537 US 186, 219 (2003).

\textsuperscript{78}In Australia, a patent may be awarded in respect of a computer software program when the requirements for patentability in the \textit{Patents Act 1990} (Cth) have been satisfied: \textit{Burroughs Corporation (Perkins’) Application} [1974] RPC 147, 158 (Graham J); \textit{International Business Machines Corporation’s Application} [1980] FSR 564, 572 (Whitford J); \textit{Re Beauregard}, 53 F.3d 1583 (Fed Cir, 1995). See generally \textit{Re Alappat}, 33 F.3d 1526 (Fed Cir, 1994); \textit{International Business Machines Corporation v Commissioner of Patents} (1991) 33 FCR 218; \textit{CCOM Pty Ltd v Jiejing Pty Ltd} (1994) 51 FCR 260.

The computer is a powerful symbol of technological progress. Once a prohibitively expensive and specialized piece of equipment, the computer has become a tool of nearly universal application, transforming such diverse fields as engineering, communications, entertainment, medicine, business, education, mathematics, and science. The computer defines our technological era as the steam engine defined the early years of the industrial revolution.\(^{80}\)

The suggestion that computer software does not fall within the useful arts because it is just an abstract algorithm for computers is superficial at best. Software is more than just an algorithm for computers; it is a useful and practical application of ideas. Software is a means of describing a useful process in language that can be processed and automated by a general purpose computer. This is an ideal means of simplifying complex, difficult or repetitive tasks that would otherwise be prone to human error or time consuming.

The Federal Circuit’s *Bilski* decision threw the patentability of computer software into doubt and has created ambiguity where it did not exist before by leaving the issue unresolved.

We leave to future cases the elaboration of the precise contours of machine implementation, as well as the answers to particular questions, such as whether or when recitation of a computer suffices to tie a process claim to a particular machine.\(^{81}\)

After such a blithe dismissal of the issue, we were left to speculate about the continued patent eligibility of software. It is not clear whether a computer software program running on a general purpose computer is a ‘particular machine’, as required by the first part of the test. Secondly, is not clear whether a computer software program causes an acceptable physical transformation that constitutes more than mere extra- or post-solution activity when run, as required by the second part of the test.


\(^{81}\) *In re Bilski*, 545 F.3d 943, 962 (Fed. Cir. 2008).
The first limb of the machine-or-transformation test, the requirement that there be a particular machine disclosed, would arguably exclude a software application intended to run on a general purpose computer, as it would not be tied to a particular machine. As far as the second limb is concerned, the transformation element, it is unclear whether a transformation of data that does not reflect a physical object in the ‘real world’ is sufficient.

A sensible resolution to the uncertainty as to whether computer software running on a general purpose computer satisfies the first limb of the machine-or-transformation test is found in *Alappat*. There the Federal Circuit explained that programming a general purpose computer:

> creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software… Consequently, a computer operating pursuant to software may represent patentable subject matter, provided, of course, that the claimed subject matter meets all of the other requirements of Title 35. In any case, a computer, like a rasterizer, is apparatus not mathematics.\(^8^2\)

There the court swept away any concern that that software programs should be excluded from patent eligibility for lack of physical effect or transformation, and demonstrates the efficiency of creating software that runs on an existing machine, rather than creating a new machine.

Arguments that a liberal reading of the ‘transformation limb’ would be satisfied by software running on a general purpose computer because it causes electrical currents to surge through the computer\(^8^3\) are misguided as questions about the need for software to involve a physical effect or cause a physical transformation of matter display a misunderstanding of the technology. Asking these questions misses the point that computer software is directly analogous to the mechanical innovation of

\(^{82}\) *In re Alappat*, 33 F.3d 1526, 1558 (Fed. Cir. 1994).

\(^{83}\) Wright, above n 32, 33-35.
previous times.\textsuperscript{84} More importantly, it displays a misunderstanding of the significance of general purpose personal computers, and the momentous effect they have had on innovation as a platform upon which new automated processes can be built. The value of many software programs is not the transformation of a physical object, but results generated from information processing or the automation of some manual task. For example, an invention that halves the time it takes for a computer to load an operating system and thus boot up does not necessarily transform anything physical, but is an improvement to existing machines and increases productivity by allowing people to spend time on productive enterprises, rather than being idle.

The patentability of software in Australia following \textit{Grant} is more difficult to comment upon since the physicality requirement introduced in that case was described without particularity and the case did not involve a software claim. However, the court did indicate that the mere fact that computer software is capable of running on a machine would be sufficient to satisfy its physicality requirement.\textsuperscript{85} What remains for the courts in Australia is the test of explaining what the rationale for this rule is.

The supposed problems surrounding the patent eligibility of software will dissolve when it is properly understood that computer hardware is the underlying foundation upon which new technology can be built. Since general purpose computing machines already exist, programmers no longer need to ‘reinvent the wheel’, so to speak, by building their own machine. While computer software designed to run on a general purpose personal computer does need a machine to run, the machine itself forms part of the prior art and predates any inventive advance the programmer is responsible for.

\textsuperscript{84} For instance, the suggestion made by Graham and Whitford JJ in \textit{Burroughs Corporation (Perkin’s) Application} [1974] RPC 147, 161 and \textit{International Business Machines Corporation’s Application} (1980) FSR 564, 569 that computer software would need to be recorded on some physical storage media to be patentable subject matter is irrelevant. A distinction is drawn between computer software inventions that require new hardware or a new arrangement of hardware to operate, or fix a perceived technical shortcoming in the computer itself (such as was the case in \textit{Diamond v Diehr, Arrhythmia Research Technology, Inc v Corazonix Corp, In re Alappat, AT&T v Excel}, and to a lesser extent in \textit{CCOM v Jiejing}); and computer software inventions that are purely concerned with the processing of data, whose contribution does not exist independently of the computer, such that they are able to run on any general purpose computer (such as was the case in \textit{State Street, International Business Machines Corporation v Commissioner of Patents}).

\textsuperscript{85} \textit{Grant v Commissioner of Patents} [2006] FCAFC 120, [32] (‘In \textit{Catuity} and \textit{CCOM} as in \textit{State Street} and \textit{AT&T}, there was a component that was physically affected or a change in state or information in a part of a machine. These can all be regarded as physical effects.’).
The consequence is that most non-obvious computer software designed to run on a general purpose personal computer will not involve an inventive advance that has any significant physical element. This does not change the fact that a piece of software can be as useful and socially beneficial as any machine.

To think that computer software running on a general purpose computer might be unpatentable because it does not involve a physical effect or transformation is to confuse an incidental physical medium with the inventive breakthrough. The fallacy inherent in this thought becomes obvious when the principle of hardware/software equivalence is considered. That principle is that anything implemented in software can also be replicated in hardware to achieve the same result. The benefit of building functionality into software is that software is much easier and less expensive to produce than specifically-programmed hardware machines or components. For every general purpose computer running under the control of computer software, there is potentially an equivalent and indistinguishable device consisting solely of hardware that is ‘programmed’ with capacitors, transistors and other circuit elements, solder joints, and wires and so forth to achieve the same result. Since a machine such as this is undoubtedly patentable subject matter, there is no reason why functionally equivalent software that does exactly the same thing should be treated differently. For these reasons, patent drafting that seeks to show a physical interaction between software and an underlying computer misses the point, promotes form over substance and is unnecessary. According to Durham:

Such things should be considered to be at the core of patentable subject matter, without straining to rely on the tangible aspects of the computer hardware. The silicon and wire of the computer circuits, the electrons that

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86 Karjala, above n 7, 444-445; Fitzgerald et al, Internet and E-commerce Law, above n 62, 299
87 That being said, it is still prudent for patent attorneys to draft patent applications claiming computer software in a way that makes specific reference to physical objects, such as input devices for receiving data, interactions with the computer’s memory for storing data, interactions with the computer’s processor, and an output mechanism for displaying data to a human (or another machine), for the reason that the Supreme Court in Bilski v Kappos has made clear that the presence of a machine-or-transformation is an indication of patent eligibility, even though the hardware often has little or no connection to the inventive breakthrough. Cohen and Lemley call this ‘the doctrine of the magic words’: Julie Cohen and Mark A Lemley, ‘Patent Scope and Innovation in the Software Industry’ (2001) 89 California Law Review 1, 9.
course through those circuits, the mouse and keyboard that provide input, and
the monitor or paper that displays the results are all physical entities.88

Further, any future-looking perspective must acknowledge this. As scientists envisage
computers based on quantum mechanics, beams of light, or DNA, the irrelevance of
hardware becomes increasingly apparent.89 There may even be scope for arguing that
software that implements a ‘virtual machine’ falls within the ‘machine category under
§ 101 in United States law.

A misreading of *Gottschalk v Benson*90 led many to believe that all software
programs are unpatentable abstract mathematical algorithms.91 This is clearly not the
case. Useful software implementations appear in many industries involving
communications, transport, manufacturing, finance, medicine and entertainment.
While software does indeed consist of algorithms, software programs are useful
automated processes designed to accomplish specific practical results. While code
may appear to be expressed in a language of logic or mathematics, it is nothing more
than a set of instructions for a machine that order it to follow a sequence of steps
according to input it receives from the outside world.

Software developers are in need of patent protection from free-riders like any other
inventors. The free-rider problem is of particular concern in the software industry
because computer software is particularly vulnerable to almost instant and
inexpensive copying and the prevailing consumer culture is one that pays little regard
to unlawful duplication and sharing. The combination of massive numbers of
educated people in highly networked communities, readily available and inexpensive
mass data storage, high speed communication and data transfer facilities, plus a
culture of freely sharing other people’s work, means that software copying and
emulation is the norm.

Opposition to software patents stems from a philosophical viewpoint that sharing and
reuse of information and ideas should be the norm, rather than innovation theory.

88 Durham, above n 80, 1514.
89 Ibid 1514.
90 409 US 63 (1972).
Many in the free and open source software communities share that philosophical viewpoint. Free and open source software projects depend on vast distributed networks of volunteers engaging in peer- and user-led production of content. In many circumstances, distributed networks of knowledge can be superior to other, more formal modes of knowledge production. What motivates people to volunteer their time and effort to open source projects is recognition from peers and potential employers or investors.

Opponents of software patents say that privatising the ideas that underlie software code is inconsistent with principles of openness that are the benchmark of the collaborative distributed open source software projects that create products such as varieties of the Linux operating system, the Mozilla and Firefox web browsers, and the Apache server. Although open source software producers impart a valuable community service by providing an inexpensive alternative to the products of corporate behemoths like Microsoft and IBM, they consistently follow the lead of these companies. While there is undoubtedly innovation in free and open source software, many programs emulate (copy) the functionality and look-and-feel of the products of the market leaders who routinely rely on patent protection for their new software.

Much opposition to patenting software is based on concerns that patents are being granted over known software techniques, algorithms, or ideas. These concerns generally relate to patents over processes that are already being used in code, or are an obvious implementation of existing techniques. They recognise all too well the stifling effect of improperly awarded software patents and the difficulty and expense involved in having them removed from the patent register. As has been explained

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92 For an explanation of free and open source software models and the differences between them, see Brian Fitzgerald and Nic Suzor, ‘Legal Issues For the Use of Free and Open Source Software in Government’ (2005) 29(2) Melbourne University Law Review 412, 413-414.


94 For an example of innovation in free and open source software, that is itself emulated by companies such as Microsoft, see Firefox Web Browser <www.mozilla.org/en-US/firefox/upgrade.html> at 12 March 2010.
above, concerns of this nature are appropriately dealt with under the criteria of novelty and nonobviousness, and not as an issue of patentable subject matter.

Rather than automatically opposing software patents, supporters of free and open source software should be thankful for the innovation of market leaders that they are free to emulate as a result of the fact that those market leaders accept that copying is an immutable part of the programming landscape, and even share some of their patent portfolios by pledging not to enforce some of the patents they own.\textsuperscript{95} Assuming there is nothing that can be done to prevent software patenting,\textsuperscript{96} the next best option for those in the software community who are concerned about software patents is to take steps to ensure that only deserving software patents are issued by becoming involved in projects like Peer-to-Patent and those that publicise new ideas to quickly fill prior art repositories that can be searched by patent examiners when they are determining the patent eligibility of software inventions at the examination stage.\textsuperscript{97}

It is difficult to mount an effective challenge to an invalid patent or undeserving patent application when the relevant prior art cannot be located. It is particularly difficult for patent examiners to locate and understand relevant software prior art. Not all software code or documentation describing how software is coded is publicly disclosed. Often software code and documentation is a jealously guarded trade secret. In many cases, the only publicly available documentation may be the object code itself, which cannot be interpreted by a human. Even if source code is disclosed, it is still difficult for an examiner to decipher it in the available time patent offices allow for examination.

A related issue is that the courts need to better understand the nature of non-obviousness in computer software. They need to ensure that claims to computer programs that merely automate processes that are well known outside computer science are not automatically found to satisfy the inventive step requirement for

\textsuperscript{96} Given that software patents have been a part of the legal and technological landscape since Diamond v Diehr, 450 US 175 (1981) and International Business Machines Corporation’s Application (1980) FSR 564 (PAT) it seems unlikely that they will be removed from the scope of patentable subject matter any time soon.
\textsuperscript{97} For example see the Open Source as Prior Art (OSAPA) initiative <http://www.linuxfoundation.org/programs/legal/osapa> at 3 March 2010, discussed above.
patentability simply because such a process has not been previously automated, thereby repeating the error of the Federal Court in *Welcome Real-Time v Catuity*. Instead, the patent applicant needs to show that the automation is not merely a routine application of computer programming principles that would be obvious to one skilled in the art of computer programming.

### B Business Methods

That a physicality requirement is too blunt a tool with which to confine the scope of patentable subject matter is demonstrated by its effect on business methods. In *State Street*, Rich J declared that there is no business method exception, a position which has been adopted in Australia. The effect of the *Grant* and *Bilski* decisions has been to restrict the patent eligibility of business methods to those that are embodied in a physical machine or device or involve a physical transformation of matter. This begs the question, what material difference is there between business methods that involve a physical effect or transformation and those that do not, to justify the extension of the patentable subject matter to include the former but not the latter?

The term, business method, is notoriously difficult to define, although, arriving at a precise definition is not essential, given that business methods are not regarded as a category of excluded matter. Given the difficulty in striking upon a definition, it is not easy to distinguish between methods of doing business and tools or techniques useful in conducting business. It is sufficient to say a business method is an artificial process in which the inventive element lies in entrepreneurial strategy.

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98 Andrew Christie and Serena Syme, ‘Patents for Algorithms in Australia’ (1998) 20(4) Sydney Law Review 517, 548 (‘Accordingly, it seems to be the case in Australia that a claim to the computer automated form of an algorithm that is well known outside computer science will usually be found to satisfy the inventive step requirement for patentability.’).


100 *Welcome Real-Time SA v Catuity* [2001] FCA 445, [129]; *Grant v Commissioner of Patents* [2006] FCAFC 120.

two attributes of the expression that stand out. Firstly, it describes what is essentially a commercial (as opposed to technological) activity, and secondly, it describes a process rather than an apparatus or an artefact, so that any physical or software elements that are claimed are usually at such a high level of generality that they are for all practical purposes nominal. Accordingly, the definition is one that can attach to a method that either has or does not have a physical effect. ‘Pure business method’ patents are a subset of business method patents. They are ‘methods of operating an aspect of a commercial enterprise which do not involve a physical aspect’, or in other words, are business methods that not tied to, implemented in, or worked in conjunction with a physical device, such as a computer.

The patentability of business methods has been of great controversy in recent years. Kevin Schubert’s analysis in this regard bears repeating. He notes that there are two main criticisms of business methods put forward. The first concerns the quality of patents granted, and the second is one of economic inefficiency. The main criticism raised in relation to business methods patents is that they are often of low quality, and accordingly, cause more harm than good. For example, Kennedy J expressed concern over business method patents for their ‘potential vagueness and suspect validity.’ A quality patent is one likely to meet the requirements of novelty, inventiveness and sufficiency of specification, and thus not likely to be found invalid if challenged. A low quality patent is one that is demonstrably not novel or non-obvious, which should be found invalid. This criticism stems from the perception that patents more often than not claim business practices that are already known and widely used in the

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102 McEnery, ‘Patents for Intangible Inventions in Australia After Grant v Commissioner of Patents (Part 1)’ above n 101, 70.
104 eBay Inc. v MercExchange, LLC, 547 US 388, 397 (2006) (Kennedy J) (concurring). Kennedy J took the view that infringement of business method patents may not merit injunctive relief because of their ‘potential vagueness and suspect validity.’ The Supreme Court unanimously decided that a permanent injunction should not automatically be issued following a finding of patent infringement.
community, which is a question of novelty. One of the particular criticisms of patent offices in this regard is their perceived inability to see that the automation of processes that were previously performed manually do not amount to novel methods of performing business processes. Internet business methods, in particular, have been labelled as low quality patents for this reason. Another concern is that business method patents protect methods that are widely practiced, but not necessarily documented, which are thus undiscoverable by patent examiners who seek prior art to reject patent applications.

As Schubert notes, some commentators have challenged this conventional wisdom. What they say is striking about the business method controversy is the manner in which this consensus surrounding the quality of business method patents has been formed. They hold that typically opponents of business method patents have offered only opinions and anecdotal evidence, usually in the form of one or two broad business method patents such as the Amazon.com one-click patent, to support this theory, rather than empirical evidence.

While there may have been teething problems with the examination of business methods when they first began to appear en mass, those problems would not appear to be as serious as some might suggest. Empirical studies indicate that business method patents are not of low quality, nor are they inferior to other kinds of patents in the quantity and quality of prior art they cite. It has been found that problems of patent quality exist in all fields of technology and do not exist in greater proportion in business method patents. In any event, this, if it is indeed a problem, is not an issue

110 Allison and Tiller, above n 105, 1082 (presenting evidence to suggest that business method patents are no less valid than other types of patents by comparing 1,093 internet-related business method patents issued through December 31, 1999 with a randomly selected sample of 1,000 contemporaneously issued patents from the general population of patents); Hunter, above n 109, 6 (taking a 10% sample of 35,184 data processing patents in classifications 700 to 707 and 715 to 717 issued between 1975 and 1999 and comparing those patents in main classification 705 patents with those in the other ‘data processing’ classifications); Allison and Hunter, above n 105, 735-736. Joshua Lerner, ‘Where Does State Street Lead? A First Look at Finance Patents 1971-2000’ (2002) 57 Journal of Finance 901.
of subject matter, but an issue that exposes deficiencies in the examination of particular patents against the requirements of novelty and non-obviousness.

The second argument against the patentability of business methods is one of economic inefficiency. The argument is summarised by Raskind.

To state the conclusion in advance of an offer of proof, the economic analysis of patent protection does not support the extension of patent protection to methods of doing business. Both economic theory and empirical studies of patent-intensive industries cast doubt on the premise that patent protection of business methods is required either as an incentive for innovation or as an ingredient of the efficient diffusion of business methods in the economy.¹¹¹

The argument is that the social costs of a proliferation of business method patents (the perceived and actual barriers to undertaking commercial activity they erect) outweigh any benefits they bring.¹¹² In this sense, business method patents are seen as undesirable because they carry the potential of turning the ‘superhighway of electronic commerce... into a toll road.’¹¹³

The anticommons danger in this respect is considerable, and the problem is compounded by the dynamic and voluminous nature of the Internet.¹¹⁴ Determining whether an invention is novel and nonobvious is hard enough in a stable field of technology. In a market in which the technology’s creative destruction is rampant, it is near impossible for anyone, let alone a patent examiner who is not necessarily perfectly skilled in each piece of technology that passes his or her desk and does not have sufficient time to conduct an exhaustive search of the prior art.

Many question whether patent protection is needed in a field where the pace of development is rapid, the costs may not be as high as in other areas (such as in

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¹¹¹ Raskind, above n 105, 64
¹¹³ Raskind, above n 105, 67.
biotechnology and pharmaceuticals), and where the advantages of being first in the
market place or trade secret protection may be a sufficient incentive to encourage
innovation to take place in sufficient quantities. They also point to the fact that there
is no evidence that the patentability of business methods will spur innovation. They
say that in the absence of data showing a need to spur innovation in business
methods, it is equally plausible that the spur of competition and the long tradition of
competition by emulation, have been sufficient to provide an adequate level of
innovation in methods of doing business.  

This logic is contrary to the established approach to determining patent eligible
subject matter, which treats all forms of innovation without discrimination. In other
words, it ignores the fact that the law regards patent eligibility as a technology-neutral
construct. In the words of Jaffe and Lerner:

There is no fundamental reason why an entrepreneur who does come up with
a novel and non-obvious method of doing business needs patent protection
less than an entrepreneur trying to make a go of comfortable high-heeled
shoes or a new way of using radio spectrum for cell phones.  

These arguments are not unique to business methods. They can be made with respect
to any technology. Why business method patents should be treated differently is
unclear, especially when business methods are normally overtly publicly available
and thus may be easily reverse-engineered, like those which run on Internet web sites
which can be observed by anyone online.  

The advantages of allowing business method patents are that innovation in business
methods produces tangible flow-on benefits for the public, such as better and less
expensive products and services, better and faster access to more products, more
profitable companies, a greater share of profits to shareholders, greater income tax

Raskind, above n 105, 78 (interestingly, Raskind does not go on to say whether e-commerce needs a
monopoly-free period to develop before becoming patent eligible); Dreyfuss, ‘Are Business Method
Patents Bad for Business?’, above n 106, 275.
Jaffe and Lerner, above n 61, 200.
Greg S Fine, ‘To Issue or Not to Issue: Analysis of the Business Method Patent Controversy on the
Internet’ (2001) 42 Boston College Law Review 1195, 1212-1213 (arguing that criticism of business
method patents ignores the realities of the Internet).
revenue for governments, and a higher standard of living for the public at large. For example, a product distribution method that enables a retailer to charge a lesser price for goods on its shelves that are identical to the goods offered for sale by other merchants, because the cost of getting the goods onto its shelves is lowered, is of important economic value and practical significance to the retailer and the public. In the same way that a person who uses a new labour-saving device to prepare food has more time devote to other creative pursuits, an organisation that improves the methods by which it conducts its core business, operates more efficiently and has more time to improve other aspects of the business.

Business methods should be patentable if they represent a novel and inventive advance over the existing state of the art. They must also be described sufficiently so as to enable a person skilled in the relevant art to reproduce the method claimed, and be reduced to a specific practical application so as to not be a mere fundamental principle or abstract idea. This should be the case irrespective of whether or not the process is tied to a machine or transforms something physical.

The focus of the subject matter enquiry should thus not be on the questions of whether business methods or non-physical methods ought to be patentable, but on ensuring that patent offices are equipped to properly identify prior art relating to these technologies. The problem of low quality Internet or business method patents, if indeed there is one, will not be solved by a physicality requirement. In any event, the introduction of a physicality requirement will do little to stem the flow of business methods that are tied to physical apparatus or physically transform matter. All a physicality requirement could achieve is an unjustified exclusion of business methods that lack a physical effect or transformation from the benefits of patent protection.

Any threat to the patentability of non-physical business processes that arises now in response to *Grant or Bilski* will encourage companies to keep their business methods secret or disguise them as other technologies. This will only hinder the advance of technology and the development of a mature pool of prior art as valuable methods will not be made available to the public, at all, or as quickly as they otherwise would. The uncertainty that remains is what an inventor of a non-physical business method must disclose to avoid the suggestion that the invention is abstract. Such uncertainty
Physical Effect in Patent Law

in the law does nothing to promote the disclosure of new methods so that the public may learn and improve upon them. The business method controversy impacts significantly upon incentives in service sector innovation. Innovation in the delivery of services is usually manifested in improvements in organising production to achieve higher efficiencies. It also impacts significantly upon the ability of business to raise capital from private equity sources if no intellectual property rights can be offered as a capital contribution. 118

C Methods of Applying the Law

Patenting methods of applying the law is a proposition many will find difficult to stomach. This is a proposition that smacks of preventing citizens complying with, and relying upon, the laws they are obliged and entitled to act in accordance with. The subject matter potentially affected includes new tax minimisation strategies, 119 trust structures and asset protection schemes, 120 corporate takeover strategies and ways to defend against them, 121 drafting techniques, wills and estates, litigation strategies and industrial relations and workforce organisation schemes.

Allowing patents over methods of applying the law has the potential to reduce access to justice by increasing costs. It will also increase the cost of compliance since legal

118 Brief of Amicus Curiae Timothy F McDonough, PhD. In Support of Petitioners, In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc), cert. granted sub nom. Bilski v Doll, 129 S. Ct. 2735 (2009) (No. 08–964) 6–7. According to Jaffe and Lerner, above n 61, providing incentives to invest in innovation and fostering the investment in the research and development that supports innovation is a key problem in patent law today.


120 Grant v Commissioner of Patents [2006] FCAFC 120.

practitioners will need to ensure they avoid infringing existing patents before advising clients or acting on their instructions.

The court in *Grant* suggested that legal methods are not patentable as they are a discovery of a basic truth about the legal system or the law. The court argued that they are thus akin to a discovery of a feature of the natural world, rather than an invention, and correspondingly should not be reserved for the exclusive use of a patentee. It should be clear that, contrary to what the Federal Court of Australia found in *Grant*, not all innovation in methods of applying the law are necessary discoveries about how the law operates, but are a practical application of legal principles. In categorising legal innovations as discoveries rather than inventions, the court in *Grant* failed to recognise the distinction between a discovery of what the law is on a particular point and an inventive scheme that is a practical application of that discovery. While there can be no inventiveness in a mere discovery, a new practical application coupled with a mode of carrying it into effect will be patentable if the method is novel, inventive and sufficiently described and enabled.

Whether the legal system will allow patents over legal methods is difficult to predict. In the United States, there is clear and consistent Supreme Court authority that establishes that patentability requires harnessing the ‘laws of nature’, which may preclude alleged inventions that harness the ‘laws of man’. On the other hand, it could equally be said that methods of applying the law are an appropriate subject matter for the grant of a patent simply on the basis of their ingenuity.

There are two main policy arguments against methods of applying the law. The first is that the right to apply the law in a particular manner is a right that should be available to all free of charge and without restriction. The second is that as there are

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123 *Grant v Commissioner of Patents* [2006] FCAFC 120, [34].
124 McEnery, ‘Patents for Intangible Inventions after *Grant v Commissioner of Patents* (Part 2)’, above n 101, 104.
125 *Funk Bros Seed Co v Kalo Inoculant Co*, 333 US 127, 130 (1948) (‘If there is to be invention from... a discovery, it must come from the application of the law of nature to a new and useful end.’)
126 Schwartz, above n 121, 351 citing *Dolbear v American Bell Telephone Co (The Telephone Cases)*, 126 US 1 (1888).
already sufficient incentives to encourage the development of innovative legal methods, there is no need for the patent system to provide further incentives.\textsuperscript{127} Schwartz argues against the patenting of legal methods on the assumption that research and development costs are much lower when creating new legal methods, as there is not the need to invest in expensive machinery or prototypes when conceiving new ways of applying the law.\textsuperscript{128} That is an easily rebuttable presumption. There are surely methods of applying the law that require much time and expense to research and develop, and there are surely industrial methods that require minimal expense, time and research to develop.

Issues regarding novelty and inventiveness also arise where methods of applying the law are concerned. There are two concerns at play here. The first is that as a result of the difficulties in identifying prior art, many of the patents that have or will be issued for methods of applying the law will involve techniques that have long been accepted as routine, or will be obvious implementations of the existing law. This creates a difficult and expensive problem to rectify in court if patents are awarded for strategies that have been already widely known and practiced. As methods of applying the law is a class of subject matter that patent offices have not traditionally been exposed to and lawyers are unaccustomed to publicising their legal strategies, current prior art repositories are unlikely to be sufficiently stocked to enable patent examiners to locate the most relevant prior art. Proving a lack of novelty may be difficult due to the fact that legal advice given by a lawyer to a client is seldom disclosed to the public at large. A legal document or letter of advice given by a lawyer to a client will not constitute prior art information if not disclosed to the public. Documents of this nature are unlikely to have been publicly disclosed if protected by legal professional privilege. What is more, a document under legal professional privilege cannot be relied on as prior art unless the client waives privilege in respect of the document. Accordingly, it may be that some patents over methods of applying the law will be improperly awarded by the patent office before it is able to accumulate a satisfactory repository of prior art. In terms of the inventive step or non-obviousness requirement, if a method of applying the law is to be patentable, it must involve an appreciable

\textsuperscript{127} Grant v Commissioner of Patents [2006] FCAFC 120, [34]; Schwartz, above n 121, 369-370.
\textsuperscript{128} Schwartz, above n 121, 369.
degree of ingenuity and not just be a novel but obvious application of the existing law.

While the issues raised highlight valid practical problems, none are arguments that cannot be applied to other technologies. Thus, it is not clear why methods of applying the law, in the event that they meet the remaining requirements of novelty and non-obviousness, should be treated any differently to other inventions. The person who discovers and reduces to practice a valuable means of, say minimising tax liability under certain circumstances, and discloses it to the public rather than keeping it secret should be allowed to reap a benefit, in the form of a fee, from others who make use of that means. Surely innovative developments in the way law is applied that achieve a useful result that is of economic significance are of a commercial character and therefore ought to be encouraged by the reward of the monopoly protection afforded by a patent. We return once again to the same argument, that as with other classes of technology, allowing patents for new and non-obvious advances over prior techniques, that involve an application of the law to achieve a desirable result, is one way to encourage the devotion of greater efforts in this field.\(^{129}\) Incongruously, methods of applying the law would be patentable subject matter under the Federal Circuit’s machine or transformation test if carried out by a machine. As with business methods, a physicality requirement will not exclude methods of applying the law that are somehow embodied in a physical apparatus or involve the transformation of matter, such as where the method in question is incorporated in a computer software program. Removing only methods of applying the law that are somehow embodied in a physical apparatus or involve the transformation of matter from patentability is plainly a course of action that will lead to anomalous results and artful drafting.

The answer for how to deal with patents over methods of applying the law is to be found in the cases dealing with patents over methods of human medical treatment. In *Anaesthetic Supplies Pty Ltd v Rescare Ltd*,\(^{130}\) Lockhart and Wilcox JJ, by majority, resolved the question on technology-neutral and industry-neutral grounds, saying that what is required is recourse to logic, not emotion or policy. They were of the view that it is for the legislature, not the courts, to determine whether otherwise patent

\(^{129}\) Maurer, above n 25, 1080.

\(^{130}\) (1994) 50 FCR 1 (Lockhart, Sheppard and Wilcox JJ).
eligible inventions should be denied protection on matters of ethics and social policy, and that since the legislature had not seen fit to exclude methods of human medical treatment, it is not open for the courts to do so. The same arguments can be applied to methods of using the law. Since the legislature has not ruled them out, they are as patent eligible as any novel and inventive advance in any other field of endeavour.

D Financial Services

Patenting financial services and products is surprisingly not a new phenomenon. According to the USPTO, forty-one financial apparatus and method patents in paper-based technologies were awarded in the United States dating back as early as 1799. These include patents for bank notes, bills of credit, bills of exchange, check blanks, detecting and preventing counterfeiting, coin counting, interest calculation tables, and lotteries.131

Financial services patents are arguably a subset of business method patents and patent over methods of applying the law. They are yet another vehicle that demonstrates why patent law should not contain a physicality requirement.132 Examples of deservedly patent eligible subject matter include: the Black-Scholes equation, which is the foundation for most options pricing models;133 a process for securitising mutual funds; and a method of valuing a mutual fund product (commonly known as a Master-Feeder fund), which was the alleged invention considered in State Street.134

A physicality requirement would arbitrarily exclude new and valuable financial services. That new financial products only transform the non-physical financial risks and legal liabilities of market participants is not cause to render them unpatentable. While they largely involve innovation in the application of the law, contractual

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131 USPTO, White Paper on Automated Financial or Management Data Processing Methods (Business Methods) (2006), 3-4 and appendix A citing Edmund Burke, Commissioner of Patents, List of Patents for Inventions and Designs, Issued by the United States from 1790 to 1847 (1847). One of these is United States Patent No. 853,852 (Issued May 14, 1907) (‘Insurance system’) issued to Adams.
133 William M Landes and Richard A Posner, The Economic Structure of Intellectual Property Law (2003) 306. The Black-Scholes options-pricing model is a differential equation that values stock options, based on the assumption that the underlying stock price moves according to Brownian motion. The Black-Scholes options-pricing model is not itself patentable because it is simply a mathematical algorithm, but a novel and useful method employing the model would be patentable subject matter.
relationships between entities, or the management of property or human expertise, this does not necessarily place the financial services industry outside the scope of patent system.

Innovation in the realm of financial services is as valid and valuable as innovation in the mechanical and industrial arts. Financial services firms innovate to provide better services to their clients than their competitors. Innovation thus creates a public benefit in the form of access to better services. While there are other incentives that encourage innovation in financial services that would exist without the patent system, that is no ground for excluding innovation in this category from patent law’s incentives.

**E Communications**

Communications technologies concern the transmission of information. Most users of modern communications technologies utilize those technologies without having regard to the physical structures upon which their communications are transmitted. Over the years, innumerable communications methods of far-reaching economic and social consequence that do not disclose a physicality requirement have been rightfully afforded patent protection. Had the movement in favour of a physicality requirement prevailed earlier, many of these inventions might never have been either conceived at all or conceived as early as they were. For example, Samuel Morse’s claim 5 to a method of signalling using electromagnetism to send telegraph messages, does not disclose a physical element and would not have been patentable. Edwin Armstrong, known as the father of FM radio, was awarded a patent for a process that was rapidly adopted in nearly all radio communication and remains a standard for radios, television sets, mobile phones and other wireless devices. It involves converting, or shifting, the received radio signal from its broadcast frequency to a lower, so-called intermediate frequency for processing. This dramatically reduces the cost of receivers and simplifies receiver design. This claim alone, without a physical receiver to

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135 *O’Reilly v Morse*, 56 US 62 (1854).
136 United States Patent No. 1,342,885. Claim 1 of the Armstrong patent reads:
delimit its scope, involves only a series of steps performed on energy (or a signal), and therefore would not satisfy a physicality requirement. Also in doubt would be claim 2 of the Hellman patent to the public key encryption system, an invention of immense significance because it allows secure data transmission.

That these break-through inventions in the field of communications would not be patent eligible as a consequence of a physicality requirement being invoked further demonstrates the error of the Federal Circuit majority in *Nuijten*.

F Biotechnology

The patent eligibility of biotechnology inventions can be dealt with briefly because these would largely be unaffected by a physicality requirement. Biotechnology involves the exploitation of biological processes or living micro-organisms for industrial purposes, especially the genetic manipulation of micro-organisms for the production of antibiotics and hormones.

The effect a physicality requirement on new innovation in biotechnology would likely be limited. Most, if not all, new inventions in the field of biotechnology will be patentable subject matter, because they exist in the realm of the physical. Biotechnology inventions will be patentable subject matter provided that they claim something more than just a scientific theory, discovery of a natural phenomenon or principle of nature.

1. The method of amplifying and receiving high frequency electrical oscillatory energy which comprises, combining the incoming energy with locally generated high frequency continuous oscillations of a frequency differing from said incoming energy by a third readily-amplifiable high frequency, converting the combined energy by suitable means to produce said readily-amplifiable high frequency oscillations, amplifying the third said high frequency oscillations, and detecting and indicating the resulting amplified oscillations.

137 United States Patent No. 4,200,770 (filed September 6, 1977) (*Cryptographic Apparatus and Method*).

138 *In re Nuijten*, 500 F.3d 1346, 1356 (Fed. Cir. 2007) (holding that signals are transitory and intangible, and therefore not ‘manufactures’ or ‘articles’).

G  Methods of Medical Treatment

Like methods of applying the law, patents on methods of medical treatment are an impediment to professionals providing services to the public in a cost-effective and timely manner and to researchers who want to improve upon existing techniques. Breyer J elegantly identified some of the problems in his dissent from the Supreme Court’s decision to revoke certiorari in Laboratory Corporation of America Holdings v Metabolite Laboratories, Inc. (‘Labcorp’).140

If I am correct in my conclusion... that the patent is invalid, then special public interest considerations reinforce my view that we should decide this case. To fail to do so threatens to leave the medical profession subject to the restrictions imposed by this individual patent and others of its kind. Those restrictions may inhibit doctors from using their best medical judgment; they may force doctors to spend unnecessary time and energy to enter into license agreements; they may divert resources from the medical task of health care to the legal task of searching patent files for similar simple correlations; they may raise the cost of healthcare while inhibiting its effective delivery.141

The Federal Circuit’s predictable response to this dilemma has been to apply the machine-or-transformation test. In Prometheus v Mayo,142 the Federal Circuit applied the machine-or-transformation test to determine the patent eligibility of methods of providing medical treatment to a human being. The court upheld the patent eligibility of ‘a series of transformative steps that optimizes efficacy and reduces toxicity of a method of treatment for particular diseases using particular drugs.’143 The applicant claimed methods of medical treatment that involve calibrating the proper dosage of thiopurine drugs, which are used for treating both gastrointestinal and non-gastrointestinal autoimmune diseases. To that end, the patents claim methods to optimise therapeutic efficacy while minimising toxic side effects. The diagnostic

140 126 S Ct 2921 (2006).
142 581 F.3d 1336 (Fed. Cir. 2009) (Michel CJ, Lourie and Clark JJ). Lourie J gave an opinion on behalf of the court. District Judge Clark from the United States District Court for the Eastern District of Texas sat by designation.
143 Ibid 1349 citing In re Grams, 888 F.2d 835, 839 (Fed. Cir. 1989) (citations omitted).
element of the methods involves an iterative testing mechanism in which a drug is injected into a patient and the patient’s metabolic response is measured. Subsequent doses are re-calibrated according to the measured metabolic response.\textsuperscript{144}

The court noted that administering drug treatment transforms the biochemical makeup of the patient’s body for the purpose of treating disease because ‘drugs do not pass through the body untouched without affecting it.’\textsuperscript{145} All methods of treating the human body necessarily involve a physical effect or transformation because they cause biochemical transformations within the body. Those transformations might be caused by the administration of a drug, a surgical procedure, the administration of physical treatment (such as massage), or treating people’s thoughts to affect their behaviours and emotions (either through counselling, drug treatment, or both). As such, the court said they may be patent eligible, provided they can properly be classed as new and useful inventions, and that any physical aspect is ‘central to the purpose of the claimed process.’\textsuperscript{146} However, those physical transformations should be regarded as patent eligible transformations only to the extent that they do not pre-empt the use of a law of nature or naturally occurring phenomenon.

In reaching its decision, the court explained that methods of medical treatment that cause these biochemical changes do not impermissibly claim or wholly pre-empt the use of natural phenomena, because they are a procedure for treating a person that involves the practical application of a discovery of natural phenomena. This assertion

\textsuperscript{144} Ibid 1339. The only issue before the court was whether the claims meet the requirements of § 101. This appeal did not raise any questions about lack of novelty, obviousness, or overbreadth: 1345. According to the court, claim 1 of the ’623 patent is representative of the independent claims asserted by Prometheus in this case:

A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:

(a) administering a drug providing 6-thioguanine to a subject having said immune-mediated gastrointestinal disorder; and

(b) determining the level of 6-thioguanine in said subject having said immune-mediated gastrointestinal disorder, wherein the level of 6-thioguanine less than about 230 pmol per 8x10\textsuperscript{8} red blood cells indicates a need to increase the amount of said drug subsequently administered to said subject and wherein the level of 6-thioguanine greater than about 400 pmol per 8x10\textsuperscript{8} red blood cells indicates a need to decrease the amount of said drug subsequently administered to said subject.

A broader claim (claim 46 of the ’632 patent) does not require the administering step of claim 1 above.\textsuperscript{145} Ibid.

\textsuperscript{146} Prometheus v Mayo, 581 F.3d 1336, 1346 (Fed. Cir. 2009) citing In re Bilski, 545 F.3d 943, 962 (Fed. Cir. 2008).
is doubtful. As such, *Prometheus v Mayo* may well present an example of circumstances in which claims satisfy the machine-or-transformation test, but pre-empt of a law of nature.147

The court distinguished the Prometheus claims from diagnostic claims that merely require data gathering and correlation, rather than an introduction of drugs into the body. In doing so, it hinted that the diagnostic claim in *LabCorp* is not patentable. Although the court noted that the *LabCorp* dissent is not of precedential value, it found Breyer J’s reasoning persuasive.148 However, the present facts are to be distinguished from those in *LabCorp*. *LabCorp* involved testing for an elevated level of homocysteine and correlating an elevated level of homocysteine with a vitamin B deficiency, where any form of test, even one in the public domain, could be used. This really is nothing more than an attempt to claim, and wholly pre-empt, a natural phenomenon, namely the inverse correlation between homocysteine and vitamin B levels within the body. This is different to what was claimed in *Prometheus v Mayo*, which is a method of treatment that involves a discovery of a natural phenomenon having been reduced to a specific practical application in a treatment method. The Prometheus claims would not prevent someone other than the patentee drawing a conclusion after having observed the metabolite levels.

The court also distinguished the Prometheus claims from those in *In re Grams*149 (‘Grams’). In *Grams*, the applicant claimed a diagnostic test that involved: (1) performing a clinical test on individuals; and (2) based on the test result, determining if an abnormality existed and any possible causes of any abnormality by using an algorithm. The court found that the process was not drawn to patentable subject matter because the essence of the claimed process was a mathematical algorithm, rather than any transformation taking place within the individuals tested.150 The *Grams* process was seen in *Bilski* as merely being an algorithm combined with a data-gathering step.151 Unlike the diagnostic test in *Grams*, the administering and

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147 The Supreme Court has since granted certiorari in *Prometheus v Mayo* and summarily vacated the decision with a remand to the Federal Circuit to reconsider the matter in light of *Bilski v Kappos*.
148 *Prometheus v Mayo*, 581 F.3d 1336, 1346 (Fed. Cir. 2009).
150 Ibid 839-841.
151 *In re Bilski*, 545 F.3d 943, 963 (Fed. Cir. 2008).
determining steps in Prometheus’s methods are not mere data-gathering steps or insignificant extra-solution activity, but are elements of treatment regimes.\textsuperscript{152}

It may trouble some that the Prometheus patents appear to comprise nothing more than a discovery coupled with physically transformative steps that would be obvious to take once the discovery has been made. To many it would surely seem that the obvious use of a discovery should not be patent eligible. The use of ‘obvious’ in this context, does not mean obvious in light of the prior art, but refers to that which is obvious to try once the discovery is made. This concern is starkly brought to the fore because the methods claimed in \textit{Prometheus v Mayo} are quite uncomplicated because they do not involve many steps.

However, a method’s patentability is not determined by the number of steps involved, nor is patentability denied where the reduction to practice might appear obvious once a natural phenomenon has been discovered. Rather, the critical issue is that the inventor must not pre-empt all uses of the phenomenon discovered, or all uses within a field. Alas, it would appear that once a natural phenomenon is discovered, using the principle involved in a series of steps that includes appending seemingly obvious physically transformative steps to that discovery to produce a useful result is all that is required to get a patent, assuming that the remaining strictures of patentability are met.\textsuperscript{153}

After the Federal Circuit decision of \textit{Prometheus v Mayo}, it is clear that methods of medical treatment will satisfy the machine-or-transformation test because that they cause biochemical changes to occur within the patient’s body. This is the case despite the fact that there is no guarantee that a particular medical treatment will, in all circumstances and conditions, produce exactly the same results in all persons to whom it is administered, nor that it will not pre-empt a law of nature. Where there is uncertainty is the patentability of clinical tests to detect disease or an abnormality within the body following \textit{Grams} and its treatment in \textit{Prometheus v Mayo}.

\textsuperscript{152} \textit{Prometheus v Mayo}, 581 F.3d 1336, 1348 (Fed. Cir. 2009).

\textsuperscript{153} \textit{Diamond v Diehr}, 450 US 175, 189 n 12 (1981) (‘To accept the analysis proffered by the petitioner would, if carried to its extreme, make all inventions unpatentable, because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious.’)
There is additional evidence in the United States that Congress intended processes of diagnosis and treatment to be patent eligible subject matter. In 1996, the Patent Act was amended to explicitly exclude medical practitioners from liability for infringing a patent by the performance of a medical or surgical procedure on the human body.\textsuperscript{154} That Congress created this exclusion makes clear that new and useful methods of medical treatment are patent eligible in that jurisdiction.

The situation in Australia regarding any connection between methods of treating the human body and a supposed physicality requirement is less clear. While they evolved the application of patent law to methods of treating the human body, none of the cases involving methods of medical treatment makes specific reference to the need to produce a physical effect or cause a physical transformation of matter.\textsuperscript{155} Although methods of medical treatment involve physical biochemical transformations occurring within the body, the courts’ focus has been on the economic or commercial significance of the methods employed. It appears then, that in Australia, methods of treating the human body are regarded as being patentable, like any industrial manufacturing process, because they give a new and useful result of economic significance. Thus, they provide a good demonstration of the principle that physicality is not an essential prerequisite to patent-eligibility.

The answers to moral questions, such as whether an individual has a right to not have known medical treatments withheld because using them might infringe a patent do not arise. They are not found in the patent legislation and nor should they be. Any argument that life-saving measures should not be denied to a person in need on the basis of patent infringement can always be tempered by arguments that the medical treatment might not exist if not for patent protection, and thus is one that must be settled by the legislature.\textsuperscript{156}

\textbf{H \ Medical Diagnostic Methods}

\textsuperscript{154} This amendment was codified in 35 USC § 287(c).
Medical diagnostic methods are to be distinguished from methods of medical treatment. Methods of medical treatment are used to treat disease, illness or other ailment, and either may or may not include a diagnostic step. Medical diagnostic methods, on the other hand, are purely used to identify the nature of a disease, illness or other ailment.\(^{157}\)

Unlike methods of medical treatment, not all medical diagnostic methods involve a physical element. Some diagnostic methods involve mixing a human sample (such as tissue or blood) with another substance whose properties are known (for example, dyes such as iodine, or chemical reagents) to allow it to be observed, thus enabling a diagnosis to be made. Mixing substances in this way is physically transformative. Other diagnostic methods do not involve a physical transformation, such as those that only require an observation of the patient’s overt physical presentation (for example, a physical examination to detect appendicitis or observing blood or a tissue sample under a microscope). The facts surrounding the ‘panel test’ in \textit{Labcorp} are an example of a diagnostic method that does not rely on a physical transformation.

A physicality requirement is of little use in determining whether a medical diagnostic method ought to be patent eligible. Determining a claim’s patentability should not hinge on whether a mental step could be carried out by a device or in response to a physical transformation of tissue or blood. To be patentable, a method of medical diagnosis must involve something more than merely making an observation of some naturally occurring phenomenon and drawing a fairly obvious conclusion in light of medical knowledge. Patent law does not allow patents for a discovery of fundamental principles of nature and natural phenomena. These are excluded categories of subject matter. It is asserted that methods of medical diagnosis \textit{per se} are not patentable subject matter, because they involve nothing more than merely making an observation of some naturally occurring phenomenon and drawing an obvious conclusion in light of medical knowledge.\(^{158}\) Methods of medical diagnosis \textit{per se} are


\(^{158}\) This is the essence of what Breyer J said in the Supreme Court’s non-precedential denial of certiorari in \textit{Laboratory Corporation of America Holdings v Metabolite Laboratories, Inc.}, 126 S Ct 2921 (2006). There the ‘panel test’ created involved nothing more than a discovery that there is an inverse correlation between the concentration of homocysteine and two B vitamins: cobalamin and...
not patent eligible because they are not processes. They are a claim to the naturally occurring phenomenon itself and would wholly pre-empt the use of it, which is not permissible. Naturally occurring phenomena and any observations that can be made in relation to them are not inventions, and thus must remain in the public domain, free for all to use.

Diagnostic methods that put a human sample in a state that allows it to be observed in a way that permits a medical diagnosis to be made are patent eligible. However, it is not permissible to add mere known or obvious preparatory or data-gathering steps to a method of medical diagnosis and then claim it is patent eligible. The diagnostic method will be considered as a whole to determine its patent eligibility. The critical question is ‘What did the applicant invent?’ If the inventor has only discovered a natural correlation that indicates a particular diagnosis, then there is no invention.

I Purely Mental Steps

Claims that involve steps that can be performed solely within the human mind are directly relevant to the patentability or otherwise of purely intangible inventions, since a claim that ‘propertises’ thought is necessarily going to be one that involves an alleged invention that does not involve any physical effect or physical transformation of matter. The United States Court of Customs and Patent Appeals did away with the mental steps doctrine 40 years ago in In re Musgrave ('Musgrave').

We cannot agree with the board that these claims (all the steps of which can be carried out by the disclosed apparatus) are directed to non-statutory processes merely because some or all the steps therein can also be carried out in or with the aid of the human mind or because it may be necessary for one performing the processes to think. All that is necessary, in our view, to make a sequence of operational steps a statutory “process” within 35 USC 101 is that

folate. Samples with an elevated level of homocysteine were likely to have a B vitamin deficiency and samples with an unelevated level of homocysteine were likely not to have a B vitamin deficiency.

159 Prometheus v Mayo, 581 F.3d 1336, 1349 (Fed. Cir. 2009) citing In re Grams, 888 F.2d 835, 839 (Fed. Cir. 1989) (citations omitted).

it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of “useful arts.” Const. Art. 1, sec. 8. ¹⁶¹

Soon after, the United States Supreme Court briefly dabbled with the idea of including mental steps in the categories of excluded matter in *Gottschalk v Benson*¹⁶² and *Parker v Flook*,¹⁶³ but chose not to in *Diamond v Chakrabarty* and *Diamond v Diehr*. As explained in Chapter 3, the decision taken in *Diamond v Chakrabarty* and *Diamond v Diehr* indicates that the Supreme Court did not intend to follow its earlier decisions and did not intend that ‘mental steps’ would be included as a category of excluded matter. As Chisum noted in his criticism of *Gottschalk v Benson*:

> there is no basis for lumping together phenomena of nature and abstract concepts with “mental steps.” A process consisting partially or wholly of “mental steps” does not exist in nature and can be quite specific. ¹⁶⁴

After almost three decades, the Federal Circuit recently reinvigorated the mental steps doctrine in *Comiskey*, ruling that patent claims based solely on human thought processes are not patentable subject matter.

> However, mental processes—or processes of human thinking—standing alone are not patentable even if they have practical application. ¹⁶⁵

The Federal Circuit did the same in *Bilski*, by holding that ‘mental processes, like fundamental principles, are excluded by § 101’.¹⁶⁶ In doing so, the court impliedly ruled that a claim involving only mental steps does not satisfy the machine-or-transformation test.¹⁶⁷ The *LabCorp* certiorari denial brought new attention to the

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¹⁶¹ Ibid 893.
¹⁶⁴ Chisum, above n 79, 981.
¹⁶⁵ *In re Comiskey*, 554 F.3d 967, 979 (Fed. Cir. 2009) citing *Gottschalk v Benson*, 409 US 63, 67 (1972). See also *In re Comiskey*, 554 F.3d 967, 979-980 (Fed. Cir. 2009).
¹⁶⁶ *In re Bilski*, 545 F.3d 943, 960 (Fed. Cir. 2008) (*en banc*).
¹⁶⁷ Wright, above n 32, 52-53, is of the view that for the purpose of a physicality requirement, any physical change within a human brain that occurs as a result of engaging in purely mental processes can be discarded because the physical transformation must be artificially-induced rather than naturally-occurring. However, he is of the view that methods of treating the human body that involve an artificially induced physical change to part of the body would be patentable subject matter.
mental steps issue, however, there, Breyer J wisely left the mental steps issue out of his analysis.\textsuperscript{168}

From a policy standpoint, excluding mental processes from the scope of patentable subject matter is undesirable. Patent law protects new products and processes which are novel and inventive and meet the remaining criteria for patentability. While there may be valid concerns that processes comprising only mental steps might fail tests of definiteness, usefulness or nonobviousness, this does not mean that every invention that involves human thought ought to be ruled out at the subject matter threshold. Each alleged invention that involves mental steps must be tested against the remaining elements of patentability.\textsuperscript{169}

In many cases, mental processes will lie within one of the recognised categories of excluded matter and thereby be excluded from patentability. An example is the circumstances that arose in \textit{LabCorp}. The diagnosis method in that case, stripped of obvious or extra-solution activity, was merely an observation of a natural phenomenon. Other mental processes, standing alone, will likely be abstract ideas not reduced to practice, indefinite, or incapable of reliably producing consistent results each time the process is executed. As such, there is no need to resort to Collins’ argument that, as a matter of policy, purely mental processes need to be excluded from patentability.\textsuperscript{170}

Another basis upon which mental processes can be excluded from patentability is that the inventions claimed may not describe processes that will reliably produce identical or near identical results each time they are invoked. It is clear that a patent may not properly issue for a method dependent upon the aesthetic, emotional, or physical reactions of a human. Rejections of patents involving mental steps may reflect concerns over the imprecision or irreproducibility of methods such as these. Under this view, processes involving certain mental steps are unpatentable because,

\textsuperscript{169} Risch, above n 7, 629; Chisum, above n 79, 981.
\textsuperscript{170} Collins, above n 168. According to Collins, as a matter of policy, patent law should not be able to remove our ability to think from the public domain. Collins’ argument is that if the element of novelty exists only in the mental step, as is the case with the claim at issue in \textit{Labcorp}, then the claim is not patentable subject matter.
although they produce practical results, they do so through partially specified exercises of individual judgment or decision making.\footnote{Gruner, ‘Intangible Inventions’, above n 7, 403.}

One theory for barring protection of mental steps advanced in the United States is that protecting mental processes would limit freedom of speech and thought, conflicting with the First Amendment.\footnote{United States Constitution Amend. I.} However, the acts of thinking about and discussing ideas are not necessarily akin to practising an invention, so the First Amendment to be brought into play. No such argument exists under Australian law, as it contains no generally recognised right to freedom of speech.\footnote{Theophanous v Herald & Weekly Times Ltd (1994) 182 CLR 104.}

A concern with attempts to patent processes that are solely composed of mental steps is that claims that involve independent human choice and judgment are abstract ideas because they allow for claims that are far broader than the applicant has disclosed. These concerns can be allayed by noting that claims involving mental steps will be patentable so long as they can be properly described in such a way as to enable a person skilled in the art to successfully and faithfully reproduce them without the need to exercise significant independent judgment.

\section*{IV CONCLUSION}

The opinion expressed in this chapter is that from a normative perspective, physicality has no role to play in patent eligibility, as a physicality requirement is inapposite in the Information Age. It is a backward looking test that confines the scope of patentable subject matter to technologies of the past.\footnote{In re Bilski, 545 F.3d 943, 976 (Newman J), 1011 (Rader J) (Fed. Cir. 2008).} It essentially confines all process patents to manufacturing methods using a test that may have been appropriate during the Industrial Age, but is no longer appropriate in an information-based economy in which the next foreseeable wave of technological breakthroughs will be in the fields of nanotechnology, genetics, biotechnology, health sciences (especially in the fields of medical diagnosis, personalised medicine and neurotechnology), information technology and communications (including computer software, and computer and telecommunications networks), business methods,
environmental protection and renewable energy production. While it is likely that the majority of new breakthroughs in these areas will be bounded by physical constraints, a large percentage will not. It is this significant number of non-physical technological processes that demand an appropriate subject matter test bereft of physical constraints.

Even though there are concerns about the patent system, and in particular business method and computer software patents, introducing a physicality requirement at the threshold is a suboptimal means of addressing these concerns. Rather, it is the strictures of novelty, inventiveness and sufficiency of description that will exclude undeserving subject matter from patentability. Relying on a physicality requirement will have unintended adverse effects in various fields of technology, particularly those emerging technologies that are likely to have a profound social effect in the future.

The true position at law, that there is no physicality requirement, can only be changed by legislative intervention. It is the legislature that has the power and resources to initiate investigations, hold hearings, commission independent research, take submissions from the public, and can ultimately determine whether additional limitations on patent eligibility are needed. The existing law properly establishes a flexible technology-neutral and industry-neutral approach to the subject matter inquiry that appropriately distinguishes between that which is abstract and non-abstract, and that which is technological and non-technological, without relying on irrelevant considerations involving physical embodiment. Accordingly, it is not only traditionally recognised mechanical, industrial, chemical and manufacturing processes that are patent eligible, as patent eligibility extends to include non-physical inventions.

The role of the courts in these matters is limited to applying the patentability standards currently enshrined in law, not to act as a law maker. Such a change would require justification based on an explanation of what ends the patent system should achieve and an economic analysis of the flow-on effects. If there are compelling arguments, backed by empirical evidence, that demand that certain classes of
invention not be capable of being privatised, then it is the responsibility of the legislature to step in and address those issues.

A physicality requirement is not a panacea for the patent system’s perceived problems due to the advent of computer software and business method patents and an increase in the volume of patent applications filed each year. Concerns that there is a crisis in patent law caused by a trend of overreaching commoditisation or propertisation, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, inventiveness and sufficiency of description will exclude undeserving subject matter from patentability.

Rather than expending valuable time, energy and resources on a process of whittling down the patentable subject matter test that will have unintended and adverse consequences, those concerned about the future direction of the innovation system should focus on projects that improve our ability to properly enforce the remaining patentability standards. Both the public and private sectors should focus on establishing prior art repositories that enable new inventions and discoveries to be publicised as soon as possible, so that the teething problems that ordinarily arise when new technologies are patented are minimised. They should also focus on developing and making part of standard patent office practice projects such as Peer-to-Patent that throw the patent examination process open to expert involvement and scrutiny.

Patent law is about achieving a difficult but essential balance between too much reward for intellectual effort and too little protection for inventors from imitators and free riders. It is about providing appropriate incentives to encourage inventors to create new and inventive products and processes, without stifling innovation or unreasonably interfering with trade and commerce by allowing odious monopolies to be granted in respect of undeserving known subject matter. While a physicality requirement may appear to be a sensible limitation that keeps the bounds of the patent system within the purview of traditionally held expectations about what patents ought to protect, it ties patent eligibility to a bygone era. Given that the object of patent law is the encouragement of new and innovative technologies in whatever unpredictable form or field they arise, there are no good reasons to restrict the scope of patentable
subject matter in this way. The useful arts limitation and the recognised categories of
excluded matter are the appropriate tools to distinguish between applied and abstract
inventions, while the remaining patentability requirements of novelty, inventive step
and the need to describe the invention and fairly base claims on that description, are
the appropriate tools to distinguish other undeserving subject matter.
CHAPTER 6 - CONCLUSION

The argument presented in this thesis is that the law does not and should not contain a physicality requirement. It is argued that to be patent eligible, it is sufficient that an invention involves a specific practical application of an idea or principle to achieve a useful result, and that there is no requirement that an invention must produce a physical effect or cause a physical transformation of matter. Accordingly, it is not only traditionally recognised mechanical, industrial, chemical and manufacturing processes that are patent eligible, as patent eligibility extends to include non-physical inventions. The consequence is that the rewards of the patent system will continue to encourage new and innovative technologies, even those knowledge- and information-based inventions that will be the hallmark of the knowledge economy of Information Age.

Introducing a physicality requirement at the threshold is an undesirable means of addressing concerns that the patent system is in crisis. Rather, it is the strictures of novelty, inventiveness and sufficiency of description, properly applied, which will exclude undeserving subject matter from patentability. This solution is essential to the proper functioning of the patent system and is needed to bring legal certainty to this aspect of the law.

Previous chapters of the thesis have shown that there is no historical or theoretical basis that supports a physicality requirement. While patents have traditionally been awarded in respect of either physical artifacts or industrial, mechanical and manufacturing processes, it is not the case that the law is limited in this way. The history of the patent system reveals it to be a tool to promote innovation and economic development. As such, the sorts of invention we are likely to witness in the Information Age will receive the same encouragement as industrial and manufacturing advances of previous times.

Previous chapters reveal that the patentable subject matter tests in Australia and the United States do not contain a physicality requirement, contrary to what was found in the Grant and Bilski decisions. Instead, they show that the presence of a physical effect or transformation is merely an indication, or ‘clue’, that an invention is patent
eligible, and is not the dividing line that lies between patentable subject matter and the recognised categories of excluded matter. Rather, a physical effect or transformation is merely an indication, or ‘clue’, that the subject matter is patent eligible. Further, they show that patentable subject matter encompasses all new and useful technological advances that fall within the useful arts, but does not include the recognised categories of excluded matter, namely laws of nature, natural phenomena and abstract ideas. It is argued that the existing law properly establishes a flexible technology-neutral and industry-neutral approach to the subject matter inquiry that appropriately distinguishes between that which is abstract and non-abstract, and that which is technological and non-technological, without relying on irrelevant considerations involving physical embodiment.

Finally, previous chapters show that from a normative perspective, a physicality requirement is not desirable as a matter of policy because it is not an appropriate means of encouraging much of the valuable innovation we are likely to witness during the Information Age. A physicality requirement is not a panacea for the patent system’s perceived problems due to the advent of computer software and business method patents and an increase in the volume of patent applications filed each year. Concerns that there is a crisis in patent law caused by a trend of overreaching commoditisation or propertisation, where the boundaries of patent law have been expanded too far, are unfounded since the strictures of novelty, inventiveness and sufficiency of description will exclude undeserving subject matter from patentability.

This thesis involves an in depth assessment of the nature of patent law and its objects. Patent law is about achieving a difficult but essential balance between too much reward for intellectual effort and too little protection for inventors from imitators and free riders. It is about providing appropriate incentives to encourage inventors to create new and inventive products and processes, without stifling innovation or unreasonably interfering with trade and commerce by allowing odious monopolies to be granted in respect of undeserving known subject matter. While a physicality requirement may appear to be a sensible limitation that keeps the bounds of the patent system within the purview of traditionally held expectations about what patents ought to protect, it ties patent eligibility to a bygone era. Given that the object of patent law is the encouragement of new and innovative technologies in whatever unpredictable
form or field they arise, there are no good reasons to restrict the scope of patentable subject matter in this way. The useful arts limitation and the recognised categories of excluded matter are the appropriate tools to distinguish between applied and abstract inventions, while the remaining patentability requirements of novelty, inventive step and the need to describe the invention and fairly base claims on that description, are the appropriate tools to distinguish other undeserving subject matter.

That people would assume the reach of patent law would be limited to new machines, devices and physically-transformative methods is unsurprising given that innovation in bygone eras has predominantly been marked by technological advances of this kind. However, this is merely a reflection of the kinds of advances that have previously dominated the technological landscape and hitherto held views about the nature of technology and patent eligibility. It does not necessarily reflect the state of the law or the nature of the patent custom. The fact that there has not been a plethora of patented non-physical inventions prior to the *State Street* decision indicates only that people either presumed that non-physical are not patent eligible or did not think to patent inventions of this kind.

Many have billed the dispute over the patent eligibility of non-physical inventions as being about whether the scope of patentable subject matter should be expanded to include fields of technology not previously protected. However, this misconstrues the debate. The issue is not about expanding the scope of patentable subject matter at all. It is about excluding new fields of technology as their patent eligibility becomes apparent. The issue is in fact whether the patent system should stay as it is and continue to protect the same expansive subject matter it has always protected, or whether additional limitations should be introduced. If there is indeed a crisis of confidence in the patent system, the judiciary must resist the urge to fundamentally change the nature of the patent bargain, because doing so is likely to detrimentally impact on the incentive function it provides and the rate of innovation.
POST SCRIPT

Following the submission of this thesis, the Supreme Court of the United States handed down its much-anticipated decision in *Bilski v Kappos*, the appeal from the Federal Circuit’s decision in *In re Bilski*. The court’s in *Bilski v Kappos* is in line with the recommendations and opinions expressed in this thesis.

In *Bilski v Kappos*, the Supreme Court considered whether the § 101 patent eligibility standard contains a requirement that an invention must either be tied to a machine or apparatus, or transform a particular article into a different state or thing. It held that it does not, finding that the machine-or-transformation test is not the sole test for the patent-eligibility of process, thereby dispensing with any suggestion that the patentable subject matter test involves a physicality requirement.

The Supreme Court affirmed that Bilski’s hedging method is not patentable subject matter. As was to be expected, the decision in *Bilski v Kappos* largely falls on the interpretation of the Supreme Court’s earlier trilogy of patentable subject matter cases, *Gottschalk v Benson*, *Parker v Flook*, and *Diamond v Diehr*. The decision contains three separate opinions. The linkages between the opinions are complicated, particularly as to Scalia J’s position.

There are five main points that can be taken from *Bilski v Kappos*.

1. The Supreme Court unanimously rejected the view that the machine-or-transformation test is the sole test for determining patent eligibility. The court instead

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1 561 US ___ (2010).
2 545 F.3d 943 (Fed. Cir. 2008) (*en banc* cert. granted sub nom. *Bilski v Doll*, 129 S. Ct. 2735 (2009)).
3 409 US 63 (1972).
6 Kennedy J delivered the majority opinion, in which Roberts CJ, Thomas and Alito JJ, joined in full; Scalia J joined the opinion except as to two parts dealing with the application of the patentable subject matter standard to new and emerging technologies of the Information Age. Thus, Kennedy J’s opinion is the majority opinion, except as to those two parts. Stevens and Breyer JJ both wrote concurring opinions, in which they agreed with the decision of the court, but differed as to the reasons. Stevens J wrote a lengthy concurring opinion, issued the day of his retirement from the Supreme Court, in which Ginsburg, Breyer and Sotomayor JJ joined. Breyer J, even though he joined Stevens J’s opinion, wrote an additional and separate concurring opinion, in which Scalia J joined in part. Breyer J, seemingly in an attempt to create some degree of certainty from the court’s disparate views, sought to highlight the consistencies between the various judgments in this additional opinion.
rightly took the view that the machine-or-transformation test is ‘a useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under §101’. The court noted that limiting the definition of ‘process’ in § 100(b) to processes involving machines or other physical devices, or to physically-transformative processes does not conform to any ‘ordinary, contemporary, common meaning’ of the statutory definition.

2. The court recognised that the scope of patentable subject matter comprises any ‘new and useful’ invention that falls outside the recognised categories of excluded matter. The court confirmed that those recognised categories are laws of nature, physical phenomena and abstract ideas.

3. The court was less than unanimous on the question of whether business methods are patentable, the issue being split in favor of a slender 5-4 majority. Five of the nine judges were of the view that business methods are not an excluded category of subject matter. The remaining four took of the view that they are.

4. The court by a slender majority (5-4) held that Bilski’s claims are unpatentable because they are ‘abstract’ (without, as Stevens J noted in his concurring opinion, explaining why). The majority based this finding on pre-emption, stating that:

   Allowing petitioners to patent risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea.

Writing on behalf of the remaining four judges, Stevens J preferred to reject the claims on the basis that they invoke a business method, and are unpatentable on that basis. Had he garnered a majority, Stevens J would have added business methods to the recognised categories of excluded matter.
5. Four of the judges did not endorse the controversial State Street ‘useful, concrete, and tangible result’ test, while a majority of five rejected it outright. The Federal Circuit below had also rejected this formulation as being inappropriate to determine patent eligibility.

The Supreme Court’s decision, while helpful in the sense that it dispels the imprudent notion that patent law involves a physicality requirement, offers little clarity as to how to determine whether an invention that is not embodied in a physical artefact, or does not involve a physical transformation of matter, falls within the scope of patentable subject matter. It provides no guidance as to how the difficult cases involving patents over non-physical business methods are to be resolved. Similarly, it provides no guidance as to how the excluded categories are to be applied.

Of particular difficulty is ascertaining why Bilski’s claimed invention was deemed to be abstract by Kennedy J and those who concurred in his judgment. On this point his Honour says little more than that the hedging method is analogous to patents the Supreme Court has previously rejected in cases such as Gottschalk v Benson and Parker v Flook:

Even though petitioners’ application is not categorically outside of §101 under the two broad and atextual approaches the Court rejects today, that does not mean it is a “process” under §101. Petitioners seek to patent both the concept of hedging risk and the application of that concept to energy markets. Rather than adopting categorical rules that might have wide-ranging and unforeseen impacts, the Court resolves this case narrowly on the basis of this Court’s decisions in Benson, Flook, and Diehr, which show that petitioners’ claims are not patentable processes because they are attempts to patent abstract ideas. Indeed, all members of the Court agree that the patent application at issue here falls outside of §101 because it claims an abstract idea.

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8 Kennedy J, Roberts CJ, Thomas and Alito JJ did not endorse the State Street test, while Stevens J, along with Ginsburg, Breyer and Sotomayor, Breyer and Scalia JJ rejected it outright.
9 In re Bilski, 545 F.3d 943, 959 (Fed. Cir. 2008).
Kennedy J’s categorisation of the claims as ‘abstract’ is unsatisfactory because it does not explain how this conclusion was reached. The claims describe a series of steps a person should take to achieve a particular useful result. If Kennedy J took the view that the claims were described with such a lack of particularity so as to constitute only abstract ideas, then he should have said so.

As Stevens J noted this in his concurring opinion:

The Court, in sum, never provides a satisfying account of what constitutes an unpatentable abstract idea. Indeed, the Court does not even explain if it is using the machine-or-transformation criteria. The Court essentially asserts its conclusion that petitioners’ application claims an abstract idea. This mode of analysis (or lack thereof) may have led to the correct outcome in this case, but it also means that the Court’s musings on this issue stand for very little.

Stevens J, the author of Parker v Flook and the dissenting opinion in Diamond v Diehr, argued that the court should ‘restore patent law to its historical and constitutional moorings’. On the patentability of business methods, Stevens J provided a number of reasons why these are not the sorts of methods that have traditionally been recognised and protected by the patent system. He was also of the view that business methods are not the sort of innovation that the United States patent system was designed to protect. Kennedy J, on the other hand, did not share this view, preferring to recognise that the scope of patent protection is of broader import.

Bilski v Kappos will likely have an impact on Australian law because it contradicts the Federal Court’s finding in Grant v Commissioner of Patents10 (‘Grant’). It is probable that, given the opportunity, the courts in Australia will reconsider the narrow view of patent eligibility expressed in Grant, and use the physical effect or transformation test as a guide to patent eligibility, rather than a prerequisite.

The decision is also likely to introduce uncertainty into Australian law. Following Bilski v Kappos, the patentability of business methods in Australia, as in the United

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10 [2006] FCAFC 120.
States, is by no means a certain proposition given the Supreme Court’s divisive views on this issue. Although the decision is clear as to the continuing applicability of any physicality requirement, it is remarkably inconclusive on the application of abstract ideas as a category of excluded matter. It also creates uncertainty as to whether business methods will be included as a recognised category of excluded matter. In this sense, *Bilski v Kappos* provides Australian courts with little guidance on the applicability of the recognised categories of excluded matter.

Finally, both the Supreme Court’s and the Federal Circuit’s rejection of the *State Street* approach to determining patentable subject matter, the ‘useful, concrete and tangible result’ test, must cause the Federal Court to reconsider its endorsement of that now defunct approach as good law.
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